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Contents

Contents of previous issues can be found by consulting the Industrial Arts Index at your library

• Special Articles

Quantitative Determination of Viscose Rayon..... 25
R. W. McKay

The Scouring Action of Soap and the Modern Sulfonated Textile Auxiliaries 43
Dr. J. Davidsohn and A. Davidsohn

Will the United States Regain their Lost Trade with Latin-America? 47
H. O. Johnson

• Departments

Technical Notes From Foreign Sources..... 28

Trade Notes—New Products..... 49

Open Forum 52

• Proceedings of the American Association of Textile Chemists and Colorists

Calendar of Coming Events..... P31

The Consumer Marches On..... P32
Ephraim Freedman

The Projectoscope P38
Henry Roger

Membership Applications P40

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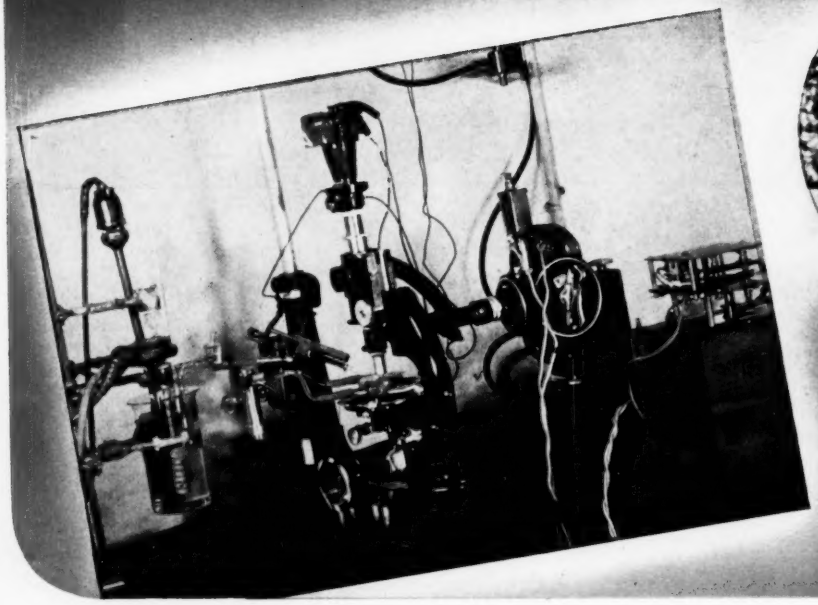

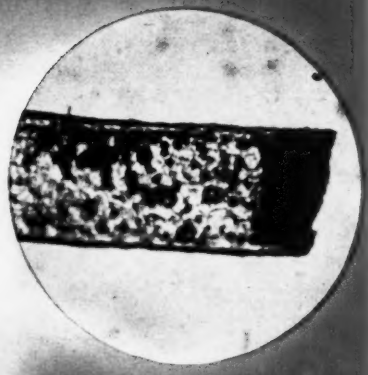

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Quantitative Determination of Viscose Rayon

R. W. McKAY*

ABSTRACT

A method of determining the amount of viscose rayon in mixtures of viscose with cotton, wool or silk is described. The procedure depends on the solubility of viscose rayon in cold sodium hydroxide solutions. Experimental data are presented showing the optimum conditions for this analysis and the degree of accuracy which can be obtained.

THE widespread manufacture of textiles containing viscose staple fiber mixed with wool or cotton or both has made it highly desirable to have a convenient and accurate method for determining the proportion of the various fibers present in a mixture. A comprehensive scheme of fiber analysis has been outlined by Mease and Jessup[1] in which the separation of viscose rayon from admixture with cotton is accomplished by treatment with calcium thiocyanate solution (sp. gr. 1.35-1.36) acidified with acetic acid at 70° C. Although this method gives results of sufficient accuracy, the necessity of thermostatic control at 70° C. and of mechanical agitation, together with the inconvenience of recovering the used solutions of this rather expensive reagent, make the development of a simpler procedure desirable.

About a year ago, Howlett and Urquhart[2] described a method of separating regenerated cellulose rayons from cotton, which depends on the solubility of rayon in solutions of sodium zincate at 14° C. The method is simple and convenient, and more accurate than the sulfuric acid method of Lloyd and Priestly[3], but it is not applicable when wool is present in the mixture. This limitation cannot be overcome by first separating the wool by boiling in potassium hydroxide since a considerable loss in rayon results from such treatment. The method of Larose[4] might, however, be used for removing wool from such a mixture, but we have found this procedure rather tedious and too time-consuming for routine analysis. The present paper describes a modification of the method of Howlett and Urquhart, which can be used to quantitatively determine viscose rayon even when mixed with wool or silk as well as cotton. The procedure as described is not applicable to mixtures containing cuprammonium rayon.

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In developing the method, the experimental procedure followed was essentially the same as that of Howlett and Urquhart and is described fully below. The solubility of wool in the sodium zincate solutions, used by these authors, at 14° C. was found to be about 15 per cent but dropped off to a very small value at 0° C. However, at this temperature cotton was found to be quite appreciably soluble at the concentrations they employed. Preliminary experiments indicated that viscose rayon could be completely dissolved in solutions of sodium hydroxide either with or without added zinc oxide for a wide range of concentrations, but that the presence of zinc oxide increased the solubility of cotton. For example, a solution of 2.5 normal sodium hydroxide at 0° C. dissolved only 3.5 per cent cotton, while solutions of 2.5 normal sodium hydroxide with zinc oxide added in the ratios 0.1, 0.2 and 0.3 to 1, dissolved 13 per cent, 21 per cent and 40 per cent cotton, respectively. All further experiments were therefore carried out without the addition of any zinc oxide.

Solubility of Viscose Rayon, Wool, Cotton and Silk in Sodium Hydroxide Solutions

Tables I, II, III and IV, below, give the results of experiments carried out in order to define the range of temperatures and concentrations of sodium hydroxide within which viscose rayon can be completely dissolved without appreciably affecting the weight of wool, cotton or silk. Each figure is the average of three separate determinations.

The wool used was 64's quality top, extracted with ether and alcohol. The cotton was a bleached fabric freed from finishing materials in the usual manner[5]. The silk sample was a flat crepe fabric, without weighting, and freed from all finishing materials.

Choice of Conditions for Analysis

The results of these experiments are illustrated in

TABLE I
Viscose Rayon

Concentration of NaOH	*Percentage Viscose Rayon Remaining Undissolved at* 10° C.	5° C.	0° C.	—5° C.
1.50 Normal ..	90%	80%	71%	45%
1.75	78	50	45	0.6*
2.00	60	35*	0.5	0.5
2.25	45	2*	0.3	0.3
2.50	3*	1*	0.5	0.3
2.75	1*	0.7	0.3	0.2
3.00	11*	1.6	0.3	1.3
3.50	94	90	..	..

*Solutions under these conditions were more or less viscous and difficult to filter.

TABLE II
Wool

Concentration of NaOH	*Percentage Wool Remaining Undissolved at* 5° C.	0° C.	—2.5° C.	—5° C.
1.75 Normal ...	...	98.3%	99.5%	99.8%
2.00	80.5%	98.3	99.5	99.8
2.50	81.8	97.8	99.4	...
3.00	85.6	95.8	...	98.0

TABLE III
Cotton

Concentration of NaOH	*Percentage Cotton Remaining Undissolved at* 5° C.	0° C.	—2.5° C.	—5° C.
1.8 Normal	99.5%	00.8%	99.4%	99.1%
2.0	99.6	99.6	99.5	99.5
2.25	99.6	98.9	98.5	...
2.50	99.6	96.6	...	95.7

TABLE IV
Silk

Concentration of NaOH	*Percentage Silk Remaining Undissolved at* 0° C.	—5° C.
2.0 Normal	99.6%	100.0%
2.25	99.7	99.7
2.50	99.9	99.5
2.75	99.7	99.5
3.0	99.5	99.6

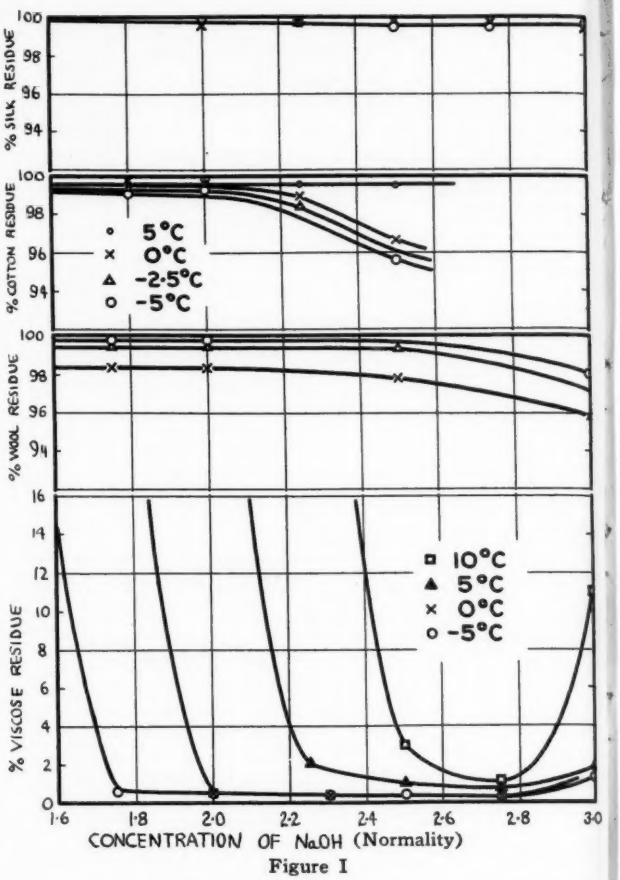

Figure I

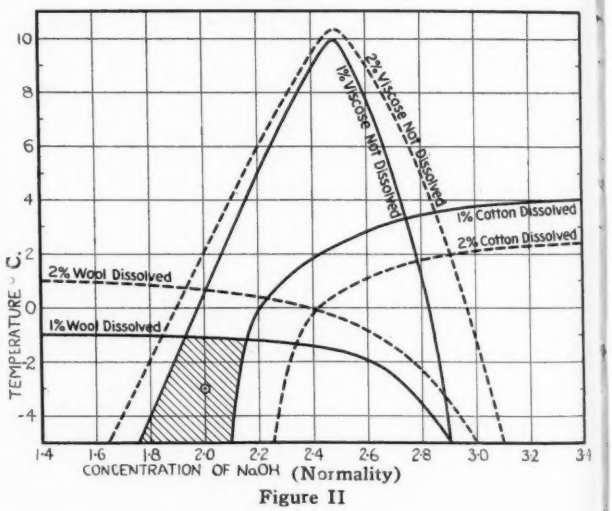

Figure II

Figures I and II. The solid lines in Figure II represent the experimental conditions for which all but 1 per cent of the viscose rayon is dissolved, and all but 1 per cent of the cotton and wool remain undissolved. The shaded area therefore gives the conditions for separating viscose from wool and cotton with less than 1 per cent error on the weight of any of the three materials. The dotted lines represent the conditions for 2 per cent residue of viscose rayon and 2 per cent loss of wool or cotton. Under all the conditions tried, less than 1 per cent of silk was dissolved.

Based on the above data, the conditions chosen for quantitatively determining viscose rayon involve the use of a 2.0 normal solution of sodium hydroxide at —3° C. A variation of ±0.1 in the normality of the solution, or ±2° C. in temperature is allowable without introducing constant errors greater than 1 per cent. (The temperature may readily be maintained within these limits without thermostatic control. A mixture of approximately 1,200 grams ice, 500 cc. water and 80 grams of common salt in a three-liter beaker even without insulation is quite

satisfactory, although somewhat closer control may be obtained if the beaker is wrapped with insulating material.)

Outline of Analytical Method

The fabric or yarn to be analyzed is cut into pieces not longer than 0.2 cm., and samples weighing approximately 0.2 grams are weighed into large test tubes. At the same time the moisture content of the material is determined by drying other samples in a weighing bottle in an oven at 105° C.

Into each of a number of test tubes, 50 cc. of 2.0 normal sodium hydroxide is measured. The tubes containing alkali and the tubes containing the fiber samples are all cooled in a bath at —3° C. After half an hour the cold alkali is poured into the tubes containing the fibers and allowed to stand at —3° C. for 1 hour, shaking the tubes every ten minutes. At the end of that time the contents of each tube are filtered through a glass filtering crucible* using suction, and rapidly rinsed with 25 cc. of 2.0 normal sodium hydroxide cooled to —3° C., followed by 50 cc. of distilled water. The residue is further rinsed with 200 cc. of 0.2 normal hydrochloric acid. The rate of filtering is slowed down by reducing the suction, to allow the acid to be in contact with the fibers for 15 minutes. The residue is then washed free from chloride and dried to constant weight at 105° C.

Chemically Damaged Cotton

When cotton is considerably degraded by chemical attack its solubility in cold alkaline solutions increases. Table V below shows the extent of this effect on various samples of cotton damaged by soaking in solutions of sodium hypochlorite. The degree of damage is indicated by the cuprammonium fluidity values determined in accordance with American Society for Testing Materials Tentative Method D539-39T.

TABLE V
Chemically Damaged Cotton

Cuprammonium Fluidity	*Percentage Damaged Cotton Not Dissolved by 2.0 Normal NaOH at —3° C.*
10.6 c.g.s. units	99.5%
13.1	99.7
18.1	99.9
20.5	99.2
23.3	97.6
25.0	95.5

It is evident that the error due to chemical damage of the cotton will not be serious over the range of fluidities which might be encountered in ordinary commercial yarns or fabrics.

Accuracy of Results

As shown by the data presented above, the constant errors in results of analyses by this method are less than 1 per cent of the weight of any of the constituents of the mixture. There will also be some error in any analysis due to random variations, and the magnitude of such errors may be judged from the deviation between the results of repeated tests. In the analyses presented below the results of three individual measurements in each case are given. The mean square deviation from their averages for these 18 determinations is 0.5 per cent from which the probable error of an individual test is calculated to be about ±0.3 per cent in addition to the constant errors referred to previously.

Certain precautions must be observed in carrying out analyses if the errors are to be kept within these limits. In the case of mixtures containing wool, undue delay in filtering allows the temperature to rise and causes some wool to dissolve. However, this error will be negligible if the filtering progresses rapidly as is normally the case. In one set of experiments the filters were jacketted with a cooling bath at the temperature of the test to eliminate this source of error, but the difference resulting was less than 0.2 per cent so that this precaution was considered unnecessary.

In weighing the residue in the crucible at the end of the analysis some care is required to avoid too much moisture being absorbed by the sample from the atmosphere. This may be prevented by placing the crucible in a weighing bottle, or by having a cover ground to fit the crucible as was done by Howlett and Urquhart. However, if the approximate weights corresponding to the crucible and residue are placed on the pan of the balance before the final weighing is made, the weighing can be made quickly enough to obtain accurate results without these precautions. In actual practice the time required for the final weighing was less than half a minute, during which time the increase in weight was found to be less than 0.1 per cent. Under extremely moist atmospheric conditions it is possible that other precautions might be necessary.

Certain resin-type finishes on fabrics are not removed by the usual methods of freeing the sample from finishing materials and may interfere with the analysis. Howlett and Urquhart[2] suggest boiling such fabrics in N/10 nitric acid for 10 minutes and we have found this pretreatment satisfactory in a number of cases. It should be noted that resin finishes may interfere with other analytical methods also. For example, consistent results were not obtained on fabric A in Table VI, when analyzed by the sulfuric acid method[6], until the nitric acid pretreatment was employed.

Analysis of Fabrics

In Table VI below are given the results of analysis of a number of samples by the cold sodium hydroxide method and by a second method in each case. The methods used for comparison are indicated by the number in brackets in the table. These methods were:

(1) Mechanical separation and direct weighing of constituents.

(2) American Association of Textile Chemists and Colorists' Sulfuric Acid Method[6].

(3) Method of Mease and Jessup[1].

The cold sodium hydroxide method described serves for the determination of viscose rayon in a mixture. Where

*Schott & Gen. Jena, No. 1G3 crucibles were used.

TABLE VI
Analysis of Fabrics

Fabric Description	Analysis (by Method Indicated by No. in Brackets) Viscose	Wool	Cotton	Analysis by Cold NaOH Method Viscose
A. Light weight suiting: (2)	65%*	35%	..	66.0*, 65.8, 65.8 = 66%
B. Light wool suiting: (3)	50†	26	24%	50.6*, 49.3, 50.6 = 50%
C. Light wool suiting: (1)	50	..	50	50.0, 51.1, 50.3 = 50%
D. Light weight suiting: (2)	65	35	..	66.4, 65.3, 66.2 = 66%
E. Lining fabric: (1)	61	..	39	61.7, 63.0, 62.6 = 62%
F. Knitting yarn: (1)	34	66	..	34.9, 35.6, 35.9 = 35%

*Resin finish on fabric interferes with analysis. Samples were first boiled ten minutes in N/10 nitric acid as suggested by Howlett & Urquhart[3].
†This analysis was carried out in another laboratory.

more than two fibers are present the other components may be found by an application of various known methods[7]. For example, a mixture of viscose rayon, silk, cotton and wool may be analyzed as follows. The viscose rayon could first be removed by the cold sodium hydroxide method, silk may be determined by the hydrochloric acid method on the residue and wool determined on a separate sample by the American Association of Textile Chemists and Colorists' sulfuric acid method. Cotton would be found by difference.

The author wishes to acknowledge the assistance of Mr. J. A. Carr and Mr. J. D. Marks in carrying out much of the experimental work recorded in this paper.

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[1]Mease and Jessup. Jr. Res. Nat. Bur. Stands., *15*, p. 189, 1935.
[2]Howlett and Urquhart. Jr. Text. Inst., *29*, p. 43, 1938.
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•TECHNICAL NOTES FROM FOREIGN SOURCES•

Recent Developments in the Deposition of Rubber Onto Textile Fibers

(*C. M. Blow—Jour. Soc. Dyers & Col., V.* 55, *No. 7.* 1939)—Recent publication in the scientific journals of several articles dealing with latex rubber would indicate that this important substance and the problem of its technical application continue to receive considerable attention, both in this country and abroad. Two such articles have appeared in the columns of this Journal within recent months. The first, by R. E. Nelson (V. 28, No. 8), discussed the general properties of latex, and the second, by B. A. Harold (V. 28, No. 10), reviewed the work which has been done in attempting to apply latex to textile fibers. Not less interesting is the paper read by H. C. Blow (Feb., 1939) before the West Riding Section of the (English) Society of Dyers and Colourists, and published in that Society's Journal for July, 1939. The basic features of Mr. Blow's work were covered in Mr. Harold's article just referred to, but to those who have not seen the original a summary of this later and more extended paper may be of interest.

After outlining the history of rubber as that substance was known in England from the 18th century and referring to its growing use in modern industry, the author proceeds to a consideration of the special research problem which is the subject of this report, the rubberizing of wool fibers.

It is pointed out that in the following work a result was sought in which the wool fiber should predominate, the rubber, applied in small quantities, serving merely as a finishing agent. Experiments in padding a worsted fabric with latex and then drying proved unsatisfactory, as the fibers were badly matted together by the resultant rubber film. An alternative method to the simple evaporation of latex was sought therefore, and that of deposition, a process analogous to dyeing, was attempted.

Rubber latex is usually alkaline from the ammonia added as a preservative. In such alkaline latex the rubber particles carry a negative electric charge. Under certain conditions an acid latex may be prepared, in which the particles are positively charged. Wool fibers carry a negative charge in alkaline solution, positive in acid solution. If wool fibers are immersed in alkaline latex, both fibers and rubber particles carry negative charges, affinity is lacking, and there is no deposition of the rubber, as under the conditions it cannot occur. In acid medium both would carry positive charges, with a similar lack of attraction. It is therefore necessary in either medium to reverse the charge on either fiber or rubber particle before deposition can take place. For such desired charge reversal "cationic" and "anionic" soaps have been found highly useful, cationic soap for charge reversal in alkaline medium, anionic soap for acid medium.

Of the four different processes available (charge re-

versal on fiber or on rubber particle in either alkaline or acid medium) the most practical and interesting is found to be that in which normal wool fibers are brought into conjunction with positively charged particles in alkaline medium.

A tabulation is made to show the dry rubber content, determined after washing and drying, of woolen fabric samples which have each been treated with 5 per cent latex by the four processes mentioned above. The results run from 0.25 per cent for wool treated in alkaline medium by normal latex of negative charge to 11.50 per cent for wool treated in alkaline medium by latex whose particle charge has been reversed to positive.

Three good photomicrographs are reproduced, the first showing wool fibers apparently unaffected when treated in alkaline medium with negatively charged latex particles, the second showing the active deposition which takes place in the same medium when the rubber particles carry a positive charge, and a third the dried fiber after deposition with its coating of rubber—a coating which, it is emphasized, is partial and not a continuous film. The significant statement is made that textiles other than wool react similarly, and deposition occurs from positively charged latex in alkaline medium.

The positively charged latex which has been evolved in this work is a stable dispersion. It can be diluted to the required rubber content, and accurate control of the deposition is possible, as the process is one of exhaustion. The rubber in latex form can be vulcanized before being deposited on fibers, and anti-oxidants, coloring matter, etc., can be added, if they are suitably dispersed and carry a positive charge.

The second part of the paper deals with the properties of wool fibers and fabrics thus rubberized, considering both the special properties they possess which might render them of commercial value and also their behavior to normal processes and treatments.

The chief special property which is conferred by the rubber thus deposited as a partial coating on the fiber is that of binding or locking fibers together and reducing their ability to move. In soft twist yarns breakage occurs normally by the slippage of fibers over one another. The presence of the rubber reduces this slip and increases the strength up to or even exceeding that of a hard-twist yarn, without sacrifice of softness. A table is introduced to show the improved tensile strength of a yarn as the rubber content is increased, the figures running from 11.5 oz. breaking strain for a 3 per cent rubber content up to 31.5 oz. for a 16 per cent rubber content.

Rubberized fabrics display greatly increased resistance to abrasion. A table shows the "wear-out time" of different fabrics, plain and rubberized, under a mechanical abrasion test, this period in one case being increased from 20 to 70 minutes in favor of the rubberized material, and in that of another from 50 to 140 minutes. Two photographs are given of carpet sections, one made from plain and one from rubberized yarns, which have both been subjected to an abrasion test. The first is worn through to the backing, with much loss of fiber; the second is but slightly worn, with no observable fiber loss. Photographs are also shown of two knitted garments, one made of plain and one of rubberized yarns, which have been subjected to a considerable period of wear. The rubberized fabric exhibits a strikingly superior appearance, both in retention of its original shape and in freedom from creasing and general effects of wear.

As regards ability of rubberized yarns or fabrics to withstand the usual processing treatments, such as dyeing, bleaching, scouring, etc., it is stated that experiments so far have indicated that none of these appears to present any insoluble problems. The wool may be dyed successfully, for example, either before or after rubberizing. Loss of rubber in ordinary milling or scouring is slight.

As to the effect of other agencies or treatments, the use of vulcanized rubber in the latex will guard against serious damage from high temperature and pressure, though extremes should be avoided. Considerable resistance may be expected to the action of oils, greases or solvents. Dry cleaning, to the extent that a normal fabric may be expected to encounter, should present little difficulty.

In a subsequent discussion of the subject the lecturer stated that preliminary work which had been carried out on cheeses definitely showed that with a soft-twist yarn, fairly loosely wound, it was possible to pump the latex through the cheese, and it was not a filtration process, because even treatment was obtained throughout the cheese. This fact appeared to be a striking confirmation of the contention that it was a true deposition, and not a filtration. As it had been previously stated that other textiles (these are not specifically named) react similarly to wool, and rubber deposition occurs on them from positively charged latices, the implications of the foregoing paper would seem to be of considerable importance in future textile development.

Dyeing Properties of Animalized Fibers and Casein Wool

(*J. G. Grundy—Jour. Soc. Dyers & Col.*, 55-7, *July* 1939)—A survey of the dyeing properties of the leading artificial fibers now available in commerce, which can be obtained in the form of either long filament or staple fibers. The following are listed: (1) Viscose Rayon; (2) Cuprammonium Rayon; (3) Cellulose Acetate Rayon; (4) Animalized Viscose Rayon; (5) Casein Wool.

The physical and dyeing properties of the first three in the form of staple fibers are well known. It has been found extremely difficult to dye solid shades on unions of these fibers with wool, and practically impossible, within ordinary cost restrictions, to produce dyeing of sufficient fastness to meet the requirements for high class clothing fabrics, etc.

As regards animalized viscose rayon and casein wool, there is available little information about their dyeing properties and the fastness of their dyed shades. Information about the former type, now brought out under numerous brands on the Continent, is especially difficult to secure; such as is available would appear to indicate that these fibers must still be considered in the experimental stage.

The animalizing of viscose rayon is carried out by the incorporation of suitable nitrogenous compounds in the spinning mass. Examples of those made by incorporating casein in viscose rayon are Cisalfa, Fibramine and Slovlna. Artilana is an example of viscose rayon containing a synthetic resin.

It may be generally accepted that the casein animalized fibers can be dyed to some extent with acid colors in a similar manner to wool. Generally, however, best productivity is obtained by using the Cloth Fast type of dye, particularly in unions with wool.

Artilana has a better affinity for acid colors than the casein-animalized fibers, and full shades with these dyes may be obtained on Artilana-wool mixtures. The Cloth Fast range and most of the Chrome Fast dyes are also employable for full shades on such mixtures, but the Neolan dyes are unsuitable, as they dye the wool much heavier than Artilana.

Having thus briefly discussed the animalized-viscose fibers, the balance of the paper (by far the larger part) is devoted to the report of a careful and detailed research into the dyeing and fastness properties of the casein wool (Lanital) and Lanital-wool unions.

The manufacturing process of Lanital, now being made in England, is outlined, and its chemical and physical properties noted. The report then proceeds to the description of a large number of dyeing trials, employing a wide range of colors, on Lanital as compared with wool. Results may be summarized as follows:

Acid and Cloth Fast Dyes. Comparative dyeing trials were made on Lanital and on wool, using Kiton Red G, at varying temperatures, both with and without assistants added to the dye baths. Results obtained emphasize the high affinity of Lanital for Kiton Red G at low temperatures compared with wool. To ascertain whether this property held good for dyes from different chemical groups, further trials were made, the dyes selected being Kiton Fast Orange G (monazo dye), Wool Red 2B (disazo dye); Cloth Fast Brown RN (disazo dye) and Kiton Blue A (triphenylmethane dye). Assistants were added to the baths in each case, and the comparative dyeings on Lanital and on wool carried out for one hour at varying temperatures, the percentage of exhaustion for each fiber being determined after ¼, ½ and 1 hour respectively. Four tables are used to show the exhaustion figures, and curves plotted to express the relation found to exist between temperature and degree of exhaustion when dyeing wool and Lanital with each dyestuff. All four dye considerably heavier at low temperatures on Lanital than on wool, and it is therefore concluded that the greater affinity of acid dyes for casein fiber at low temperatures as compared to that for wool is not dependent upon the chemical constitution of the dye.

Level dyeing tests were next made, to see if any levelling action occurred when applying acid dyes at low temperature, analogous to the levelling action of this group of colors when applied at the boil. From these the author concludes that levelling of practical value in the case of Lanital takes place only at 80° C. or higher, and that dyeing should be carried out at a temperature not below this point.

The general conclusion is reached that the majority of Acid and Cloth Fast dyes can be applied to Lanital in accordance with the normal procedure for dyeing wool. Precautions necessary are (a) use of a minimum amount of acid, preferably organic; (b) restriction of period of boiling as much as possible; (c) washing well and neutralizing any residual acid in the fiber and (d) drying at as low a temperature as possible.

Neolan Dyes. Members of this group cannot be applied to casein fiber by the normal process. Reasonably good results may in general be attained by the following recipe: The bath is set at 70° C. with 3 per cent formic acid and the goods entered; temperature of bath is then raised to 90° C. in 20 minutes and dyeing continued at this temperature for a further 15 minutes.

Chrome Fast Dyes. Testing the full range of Chrome Fast dyes by the afterchrome process, it was found that a number of colors gave little or no tinctorial value. In some instances a full shade was obtained on Lanital, but of different tone from that given on wool. A number of colors, however, gave the same results on both fibers. Where certain colors, such as Chrome Fast Red 2B, were almost destroyed on Lanital, it was ascertained that the defect was due to the liberation of formaldehyde in boiling the casein fiber. If, however, the Lanital is pretreated by boiling with 1 per cent sodium bichromate and 3 per cent acetic acid for ½ hour and washed off, the formaldehyde is destroyed and normal shades obtained on dyeing by the afterchrome process with the dye in question.

Abnormal results also occurred when Lanital was dyed with the Naphthochrome dyes by the after chrome process, the shades obtained having little relation to those produced on wool by the same process. The difference was found to be due to the formation of a color lake between the dyes and the aluminum salts present in the fiber. This difficulty was overcome if the Lanital was first mordanted with 3 per cent sodium bichromate and 2 per cent cream of tartar for 1½ hours at the boil.

In spite of such difficulties, it was found that a number of the Chrome Fast colors yield the same shade on Lanital as on wool, dyeing by standard methods without any special precautions. There is given a list of 25 such dyes, with the preferred method of dyeing (afterchrome, metachrome or reduced chrome mordant) indicated for each.

(Continued on page 48)

PROCEEDINGS OF THE
American Association of Textile Chemists and Colorists

JANUARY 22, 1940

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Members should notify the **Secretary** immediately of all address changes

• CALENDAR • OF COMING EVENTS

Meeting, New York Section, Swiss Chalet, Rochelle Park, N. J., January 26, 1940. Speaker: Dr. F. Bonnet, Jr., American Viscose Co. Subject: "Vinyon—A New Textile Fiber."

Annual Meeting, Mid-West Section, Sherman Hotel, Chicago, Ill., February 10, 1940.

Annual Meeting and Convention, auspices New York Section, October 18th and 19th, 1940, Hotel Commodore, New York City.

The Consumer Marches On*

EPHRAIM FREEDMAN**

A GOOD many people are discovering that there is a Consumer Movement. You don't have to take my word for it, if you read *Reader's Digest* or the *American Consumer,* a publication for the consumer as a consumer rather than as a troublemaker, or the partisan publications like *Printer's Ink* on the one hand and *Consumer's Digest* on the other.

Let me mention some of the national groups that have become active in the consumer movement.

There are organizations like: the General Federation of Women's Clubs with a membership of two and a quarter million; the American Association of University Women with almost 60,000 members; the National League of Women Voters with some 48,000 members; the National Congress of Parents and Teachers with a membership close to 1,900,000; the American Home Economics Association with between 82,000 and 83,000 members; the National Federation of Business and Professional Women's Clubs with about 68,000 members; the Federal Council of Churches with a membership of 20,000,000; the National Council of Catholic Women with 1,000,000 women; the National Council of Jewish Women with a membership of 49,000, besides many other organizations whose major activities are devoted either to consumer or consumer and labor problems.

These figures indicate that there is such a thing as a Consumer Movement. Let us explore it, find out if we can what it is, how it started, where it is heading for, how it will affect us as textile chemists and colorists, and how our products and our attitudes will affect it.

To begin with—the term "consumer" has been defined in a number of ways. Webster's Unabridged dictionary defines "consumer" as "one that consumes," or "one who uses goods and so diminishes or destroys their utilities." Recently one gentleman is reported to have defined "consumer" as "a disgruntled customer." I think we ought to stick to Webster's definition. We now come to the causes giving rise to the Consumer Movement. During the early years of our nation, consumers raised most of their own foodstuffs, built their own homes, made their own furniture, and created their own clothes. Seldom did they have to buy. Instead, labor and commodities were frequently bartered and exchanged. The relatively few purchases that were made were rather simple of evalution. Oats were oats and woolen meant wool—and storekeepers and consumers spoke the same broad commodity language.

While some consumers banded together in the early part of the nineteenth century to combat what they considered to be excessive costs of things they bought, the cooperative movement was barely discernible and, as one writer points out, had practically expired by 1900. But the recent machine age with its continuing expansion of industrial centers, has changed the pattern of our lives, while science and invention have helped to throw us out of step.

Made more curious by the proximity of industry, but lacking knowledge of what goes into merchandise, lacking yardsticks with which to judge serviceability, being at a loss for want of information as to the durability and care of commodities, consumers found themselves in the unenviable position of being unable to judge values. However, the prosperity of the 1920's exerted somewhat of a soporific influence on the public so that even the advent of "Your Money's Worth" by Chase and Schlink failed to arouse much more than a passing nod of recognition. It took the depression following the cataclysm of 1929 to make consumers really conscious of the fact that they had to become more expert in their buying habits or waste money. Real and so-called leaders sprang up overnight. There were champions among them. The American Home Economics Association, in existence since 1908, became more active in its demands for informative labels. Home economists spread the gospel in various colleges and through home extension groups.

Because they constituted practically the only available consumer-minded literature, bulletins emanating from Consumer's Research (founded in 1929) became classroom texts and club women's topics for discussion.

Under the N.R.A., a few years later, the Federal Government recognized the consumer by setting up a Consumer's Advisory Board. Immediately similar consumer groups were organized over the entire country. From the printing presses came more books, some dealing with cooperatives, others exposing actual or seeming shortcomings in advertising, selling methods and merchandise.

Almost as fast as one book was gobbled up, another appeared and found its way along with the Consumer Research bulletins into more classrooms, more women's clubs and more homes. Teachers began in earnest to write texts on textiles and household fabrics. High schools followed colleges in giving courses in household economics.

Women's organizations held meetings in many sections of the country and sent their leaders to Washington to demand rules making fiber identification mandatory.

Congress passed the Food, Drug and Cosmetic Act, a

*Presented at meeting, Philadelphia Section, December 8, 1939.
**Director, Macy's Bureau of Standards.

tremendous improvement over the Food and Drug Act of 1908.

And early this year there was introduced in Congress a National Standards Board Bill the provisions of which would, if enacted into law, establish consumer standard testing laboratories in each state.

While this consumer movement was unfolding, some forward looking retailers as well as some progressive manufacturers were already studying its merits, and were acting by setting up testing laboratories, conferring with various consumer groups, and testing merchandise for composition, construction, performance and durability.

Labels bearing instructions for the care of merchandise became increasingly evident. Washability labels giving more precise washing instructions began to appear. There followed labels disclosing the per cent of wool in part wool underwear, the disclosure of silk and rayon, and shrinkage of woven cotton yard goods (all Federal Trade Commission Rules), and others.

Meanwhile the American Association of Textile Chemists and Colorists and the American Society for Testing Materials undertook to recognize the Consumer Movement by creating test methods, standards and specifications, the former mainly for textiles, the latter for textiles as well as for many other commodities. The National Bureau of Standards promulgated a number of commercial standards, which unfortunately are not universally accepted by industry. Three years ago the American Standards Association succeeded in forming an Advisory Committee on Ultimate Consumer Goods. Under its auspices, consumers, retailers and government representatives gathered to discuss consumer merchandise standards. As a result of the deliberations of this Committee, a National Consumer-Retailer Council was created in 1937.

This Council is designed to provide a mechanism through which organized retailers and organized consumers can meet on equal terms, discuss the problems of merchandise and service from their different points of view and work out solutions to be recommended to retailers, manufacturers and consumers. Its stated purposes are the following:

1. To stimulate interest on the part of the consumers, distributors, manufacturers and the public in the value and use of adequate standards for consumer goods.
2. To promote the use of uniform terminology in describing consumer goods and services.
3. To promote the use of informative labeling.
4. To promote the use of truthful and factual information in advertising.
5. To promote informative salesmanship.
6. To develop and promote the use of suggested codes of ethics for both retailers and consumers.
7. To encourage practices which will tend to reduce abuses of such privileges and customer accounts, returns, deliveries and similar services.
8. To foster local cooperation between stores or groups of stores and local consumer groups.

Because the retailer comes into more intimate contact with the ultimate consumer, it is only natural that he should be in a better position to interpret the consumer's wants and help manufacturers meet consumer requirements. Unfortunately, however, relatively few retailers have yet seen fit to cooperate in this laudible effort.

Strange as it may seem, certain manufacturers' groups, relatively far removed from the consumer firing line, appear to be taking the initiative. Obviously they are doing so because they feel that they stand to gain by it, and progressive retailers and middle of the road consumers alike wish them success.

An outstanding example of such a group is the National Association of Textile Finishers, whose technical committee after months of hard work developed and presented only yesterday to the Association, a set of standard tests for fastness of color, which I understand they intend to use as a basis not only for testing but also for labeling their goods.

But while certain manufacturing groups seem to be forging ahead, let us not be too hard on the retailers. Without exception they are discouraged by generally unsuccessful efforts to obtain sufficient cooperation of manufacturing interests. How to obtain this cooperation is THE problem.

In a recently issued brochure entitled "What of the Consumer Movement?" the writer, a keen student of business and consumer trends has this to say—"The consumer field is the area of the next great economic development in this country. Normal consumer activity, anti-advertising and anti-business agitation, political efforts—all carried on as parts of the Consumer Movement, either menace business or provide it with opportunities. The results depend upon the ability of business and advertising leaders to understand and appraise the trends and plan commensurate programs of action."

Rather than look upon this movement as a menace, it should be accepted as a challenge—a challenge glistening with opportunity for those who have faith in our American Democracy and our American way of living. True it is that this challenge cannot easily be met until we fully understand it.

There is abundant evidence that consumers want certain simple factual information concerning commodities so that they can know better what they are buying and how to care for it, so as to obtain a satisfactory degree of service or utility during the existence of the merchandise. From many sources come views as to what should appear on labels and how it should appear. While we at Macy's have developed numerous informative labels, always there exists the questions—"Are these what consumers want?" "Will these help her buy more wisely and consume more intelligently?"

We recently distributed 1,000 questionnaires to visitors to our Consumer Quiz Broadcast which as many of you

probably know, is broadcast over WOR each noon at 12:45 from Monday to Friday. Out of the thousand distributed over a period of 14 days, 617 questionnaires were returned.

Following are the results of our survey:

Question 1. *Do you read the labels on merchandise you buy?*

Answers:

Total No.	Always	Usually	Sometimes	Never
617	408	154	52	3
% Replies	Always	Usually	Sometimes	Never
	66.1	25	8.4	0.5

Question 2. *What is the most important information you look for on a label when you buy?*

Answers: A number of questionnaires gave more than one answer to the above question. The number of different answers and the percentage they bear to the total number of questionnaires (617) returned are shown below:

Information	*Number*	*Percentage*
Brand and Manufacturer	207	33.6
Quality	161	26.1
% Contents; kind of material	91	14.7
Serviceability and Durability	215	34.9
Wearability	(43)	(7.0)
Washability	(47)	(7.6)
Resistance to Fading	(27)	(4.4)
Care	(27)	(4.4)
Shrinkage	(35)	(5.7)
Grade	(14)	(2.3)
Serviceability	(10)	(4.6)
Technical Information	(8)	(1.3)
Resistance to Perspiration	(2)	(0.3)
Construction	(2)	(0.3)
Seal of approval	35	5.7
Where made	33	5.3
Quantity	33	5.3
Size	23	3.7
Guaranty	21	3.4

Question 3. *Are you willing to buy unlabeled merchandise, relying only upon the honesty of the store in which you shop?*

Answers:	Total Number	Yes	No	Unanswered
	608	168	440	9

Per cent replies based on 617 returned questionnaires:

Yes	No	Unanswered
27.2	71.3	1.5

Question 4. *Does an informative label on an article influence you to buy it instead of an identical article that has merely a name on the label?*

Answers:	Total Number	Yes	No	Unanswered
	589	440	149	28

Per cent replies based on 617 returned questionnaires:

Yes	No	Unanswered
77.3	24.2	4.7

Question 5. *If technical terms such as tensile strength, thread count, bursting strength, etc., were explained on each label would this be an influencing factor in clinching a sale?*

Answers:	Total Number	Yes	No	Unanswered
	584	434	154	33

Per cent replies based on 617 returned questionnaires:

Yes	No	Unanswered
70.3	25	4.7

Question 6. *Or would you prefer to have the article merely labeled "Grade A," or "Grade B," or "Grade C," or "Grade D"?*

Answers:	Total Number	Yes	No	Unanswered
	575	231	324	42

Per cent replies based on 617 returned questionnaires:

Yes	No	Unanswered
37.4	52.5	10.1

Question 7. *Or would you prefer a grading such as "Excellent," "Very Good," "Good," "Fair" to the type of label mentioned on Question 6?*

Answers:	Total Number	Yes	No	Unanswered
	521	194	327	96

Per cent replies based on 617 returned questionnaires:

Yes	No	Unanswered
31.4	53	15.6

Question 8. *Would a seal of approval of a reputable laboratory be enough to satisfy you of the quality of the item you intend to buy?*

Answers:	Total Number	Yes	No	Unanswered
	594	491	103	23

Per cent replies based on 617 returned questionnaires:

Yes	No	Unanswered
79.6	16.7	3.7

Before we proceed with a rapid analysis of the figures I have just presented, let us pause for a moment to remember that this survey was not conducted among students, or club women, or any particular group or clique, but rather among run-of-the-mill consumers, to gather information on how to buy wisely and how to care for merchandise.

Based on this survey, we find—

First—that most consumers *do* read labels,

Second—(a) that only one-third of consumers consider brand and manufacturer identification of most importance, and (b) that the demand for disclosure of serviceability and durability is surpassing the demand for brand and manufacturer identification.

Third—that most consumers prefer labeled merchandise,

Fourth—that most consumers would rather buy commodities to which are affixed informative labels,

Fifth—that the majority of consumers will not be satisfied with mere grading of goods,

Sixth—that if grading is resorted to, the use of terms like "Excellent," "Very Good," "Good" or "Fair," are less desirable than the terms "Grade A," or "Grade B," or "Grade C," or "Grade D," and

Seventh—that the explanation of technical terms on labels will help clinch sales.

Of outstanding interest is the faith of most consumers in a seal of approval because it discloses the moral responsibility that rests (1) on technical men and women engaged in the testing and evaluation of merchandise, and (2) on those who place seals of approval on merchandise.

It is unnecessary to burden you with figures disclosing how consumers who reacted in one way to any particular question, reacted to the other questions. Nor is there much need to do so at this time, because the significance of these figures discloses in no ambiguous terms that a challenge to the relative indifference now existing in the retail and manufacturing fields does exist, and that it must be met.

During the past six years or so, more retailers came to be of the opinion that it would be to the mutual advantage of manufacturers and retailers as well as consumers to engage in informative labeling. But no retailer can hope to label more than a small fraction of this merchandise because he does not possess the necessary information nor the facilities to develop it. And because the manufacturer is slow to grant retailer demands, the retailer in most cases is about worn out and ready to call "quits."

The problem cannot be solved without the manufacturer, for he is the natural source of information. He alone knows best what goes in to his prdouct. He has or can readily provide himself with the means of evaluating his merchandise. His is the task of labeling it so that the consumer anywhere can read the label and know what she is buying. How to get manufacturers to do so by voluntary effort is the most urgent consumer-manufacturer relations problem of today.

The women who answered the questionnaire varied in age from girls in their teens to grandmothers. Only a small fraction of them have had schooling in home economics and merchandise appraisal. The younger generation though, is receiving a considerable and ever widening course in economic consumption in colleges, high schools and even elementary schools.

The charts you see posted around this hall, give you last year's picture. Much greater progress has been made during 1939. The consumer of 1940 will be more discriminating and more insistent upon receiving information than the consumer of 1939. Each year thereafter we'll see a more widespread and a more intelligent demand for informative labeling. He who heeds this demand to the manufacturer or retailer will come out on top.

We as textile chemists and colorists have our part to play in the unfolding of this drama.

The Consumer marches on and cannot be absorbed by private enterprise nor can private enterprise eradicate it. We too must march along with this Consumer Movement encouraging its growth along sane, democratic lines for the welfare of American business, American life and last, the most important reason of all for the continuance of American Democracy.

DISCUSSION

Dr. Powers: As I understood it, in the questionnaire, between 70 and 80 per cent of those answering the questions indicated that they would accept merchandise approved by some standard and approved testing laboratory and yet not over 30 per cent would accept goods approved by a store. If the high grade stores have good testing laboratories shouldn't that be sufficient?

Mr. Freedman: The answer revolves around the word "if" because there aren't enough stores that have testing laboratories. If there were, then I am sure we would find that more consumers would rely on the "honesty" of the store. We use the word "honesty." It is difficult naturally for a consumer to know when a store deliberately and intentionally misrepresents, and human nature being what it is, we are more inclined to attribute the fact that merchandise is not what it might have been to the dishonesty of the seller rather than to the ignorance or lack of knowledge on the part of the seller.

Dr. Powers: Of course, that is quite a blow in that sense to the store—this lack of confidence in the trade in the store's name?

Mr. Freedman: It is not only a blow to the store, it is also a blow to industry, because while some few stores prefer to consider themselves as buying agents for consumers and so develop in their minds a reciprocal feeling that they can trust those particular stores, the vast majority of stores are still merely distributing agents for manufacturers. Thus, what is being said of the stores or of the attitude that the consumers have of the stores also represents the attitude that the consumer has toward industry in general.

Mr. Seibert: Were the recipients of those questionnaires aware that they were prepared and distributed by Macy's?

Mr. Freedman: Yes, they were informed that they were distributed by Macy's Bureau of Standards. The Bureau occupies a rather unique position in that it frequently is called upon by consumers to decide whether the consumer or the store is right and we didn't want to hide anything from those who answered the questionnaire. Why the question, Mr. Seibert?

Mr. Seibert: I believe it might have a bearing on the answers because of the fact that if the recipient knew that they were distributed by R. H. Macy and had dealings with Macy's they might have more confidence in what Macy has done for them and in the informative labels, whereas their experiences may have been such with other dealers that it might have caused them to give a different answer. You people have a reputation, whereas the average store does not have such a reputation and these answers may have been largely dependent on their experience in dealing with Macy's and not in dealing with everyone at large.

Mr. Freedman: Your observations are very much to the point. I do not think there are enough informative labels

on the market to influence many of the consumers insofar as their replies to the questionnaire were concerned. Some of them have seen informative labels. Even the number of informative labels that we have are but a small fraction of the total amount of merchandise that we carry.

Mr. Seibert: My reason for asking that is this, that there are a number of stores who do mark their material not as a result of their own tests but merely as a stimulalation of business and it does not mean anything. If you had a number of answers from people who had an undesirable experience as a result of purchasing such merchandise, their answers would have been entirely different than if they had a satisfactory experience.

Mr. Ebersold: Have you found that the articles that are the most popular are always the best articles on the market?

Mr. Freedman: No, that doesn't hold.

Mr. Travis: Mr. Freedman, I think you have a pretty good cross section of the textile industry here and suggest you take a specific thing and indicate how much information it would be practical to put on the label, i.e., what you expect from the manufacturer? Take hosiery, for instance.

Mr. Freedman: I would like to say first of all that, except for bread and butter items and in that category I might consider the service stocking, that consumers are really interested in fashion and style, no matter what we may say about durability and serviceability, the fact remains that if the customer thinks the article is not going to look right on her she is not going to buy it. The consumer wants to know insofar as the stocking is concerned, first, whether it is going to fit her, second, whether it is durable and third, whether it is capable of being washed without changing in size and color.

The greatest problem presented to the hosiery industry is the problem of resistance to running or laddering of stockings and if the industry could develop a method of determining the resistance to running or laddering of stockings, then that information could be passed on to the consumer, and she would undoubtedly consider that to be the most important bit of information for her evaluation of hosiery. On a stocking, then, we want to have a statement as to size, as to durability and as to wash fastness.

Mr. Dohner: What do you refer to when you say laddering?

Mr. Freedman: I refer to runs in the stocking. I would like to say this about the consumer approach to merchandise as I visualize it. There are three factors which influence a consumer to buy merchandise and depending upon certain conditions she places one of these factors up on top of the scale, the next one second and the third last, and these are price, style and quality. By quality, I mean serviceability of the merchandise. A woman with a limited pocketbook who has only 49 cents to spend for stockings has to take whatever she can get for the 49 cents. If she is not limited primarily to price and it is style she wants, then she places either serviceability or price second and relegates the other to the third position. If it is serviceability she wants then she places price either in second or third position and style in the other position. These three go to make up value—style, price and serviceability.

Question: When you say durability of stockings would you include information on the labels as to the construction of the stockings, that is, whether it is a high twist, etc.?

Mr. Freedman: I don't believe that disclosing of information concerning twist means very much to the consumer. We are trying to develop a sounder attitude on the part of the consumer, educating her to remember what she really should know to evaluate merchandise.

Mr. Seibert: Assuming consumers must have a certain degree of confidence in the retailer because it is a physical impossibility to include all pertinent information on an informative label won't there always be certain reliance on the retailer?

Mr. Freedman: I don't know what you mean by pertinent information. If you are referring to information which will disclose the relative durability or performance of the article then I would call it "pertinent" information. We have to interpret the technical information into a simple consumer terminology so that consumers will be able to evaluate the merchandise. About twelve years ago we found that raincoats of the porous type were frequently the subject of customer complaints because water came through and when we tested those garments, using hydrostatic pressure of 17 centimeters which is close to 6 inches, we found that the complaints were nil. When the hydrostatic pressure was lower than 17 more complaints were had. So we set up standards for that type of garment. Materials that resisted a hydrostatic pressure of 17 centimeters were described as "shower proof." We went further and said that garments, the fabrics of which resisted a hydrostatic pressure of 50 centimeters, would be described as "rainproof," and, if they resisted that pressure for 1 hour we would call them "waterproof." A lady came into the store and asked the sales-clerk at the umbrella counter whether a certain umbrella was "waterproof" whereupon the sales-clerk replied, "No, we guarantee this umbrella at $3.69 to resist a hydrostatic pressure of 17 centimeters." The lady replied that she never went out in weather like that.

We set about studying rain and "rain" terminology and we found that rain was an indeterminate downpour of water ranging in intensity from fog to cloudburst—while shower was rain of short duration varying also in intensity from fog to cloudburst. We made a study of the various terms that might be used to describe raincoats and umbrellas and other materials so that the consumer would understand us and we would understand them, and during the course of our investigation we chose words that are known to all of you. We chose words like "rainproof" and

"rain resistant" and "rain repellent" and "rain retardant." "Proof" means "impermeable to" and "repellent" means to ward off, "resistant" means to hold off and "retardant" to slow up. We questioned thousands of consumers and technical men and women, and asked them to place these four words in their descending order of behavior or performance. "Retardant" was nearly always put in the proper place but the others were not. We decided that the following order "proof," "repellent," "resistant" and "retardant" was right even though most people weren't aware of it. However, about a year ago I was convinced that the term "repellent" denoted superior water-resistance to the word "proof," because if a fabric repelled water, the water could not possibly go through the fabric. And so if the truth is to be observed, the word "repellent" should be thrown out of the "window" insofar as resistance to water is concerned, because it just doesn't belong.

Mr. Kelleher: What is the consumer's reaction of the fastness of colors in the various textiles you have?

Mr. Freedman: About 9 or 10 years ago at a meeting of the New York Section I advocated the extension of various wash test methods for consumer use and I suggested at that time that in considering the fastness or the permanency of dyestuffs we must not lose sight of the ability of the textile fiber to withstand the washing test and therefore I proposed that the test for silks and wools be conducted at wrist temperatures, that colored goods of cottons and linens be washed at 160° F. and that white goods be washed at the same temperature with the aid of a bleach. Now, those temperatures and the washability methods were used not because of the dyestuff but because of the ability of the material to withstand washing at those temperatures and under the prescribed conditions of washing, since garments were not bought for the dye but rather for the material. We therefore advocated that silks and woolens be washed at wrist temperatures, and that they be washed with a neutral soap. We have educated millions of women to wash silks and woolens that way. We have also educated them to wash colored cotton goods by the ordinary home laundry methods which call for the use of any ordinary soap, and water starting to steam rather than at the boil. We have educated them not to use bleach on colored goods. Insofar as wash-fastness is concerned, we have very little difficulty because most of our washable merchandise is accompanied by washability tags.

When it comes to light fastness we are up against a difficult problem. We don't like to use the word "fast" because there is not anything fast under the sun. We have been using terms like excellent, good, fair, poor and fugitive to describe the degree of fading of materials and naturally we put our own merchandising people at a disadvantage when we insist that they do that too. The time is coming when light fastness will be described by numbers, or by grade, disclosing the relative resistance to fading when exposed to light.

We get a few more complaints because of the effect of perspiration than we do because of failure to withstand washing. Sometimes the complaints are due to the use of deodorants containing aluminum chloride.

Then there is the crocking of color. It is quite a problem to us. Colored materials may resist washing and light; they may resist the effect of perspiration, but they often carry an excessive amount of dyestuff that may rub off and stain adjacent garments.

Mr. Senior: Another thing, what about mothproofing of wool? There seem to be some "mothproofs" around that are supposedly guaranteed with insurance policies on them.

Mr. Freedman: Mothproofing has a definite place in the scheme of things and I think a lot of mothproofing is being done in and around Philadelphia. The term "proof" might well be discarded. I have yet to find wool material all of which will completely withstand moth ravage. No matter how good the mothproofing agent is, we have to concede that the larvae do ingest a little of the fiber before they are so affected that they will no longer feed. That is why the term "proof" does not belong. Now, we, for example, are selling blankets, garments and rug-felt with a guarantee, but we try to make it very clear that we are not selling "mothproof" merchandise but that what we offer our customers, and I think this might well be followed by others, is in the nature of insurance. If you will visualize the insurance that you carry, whether it be for burglary, accident, life or fire, you will realize that that insurance does not guarantee you against meeting with an accident or against fire, or against having anything stolen, or against dying. But you are assured that in the event that something does take place, you will be reimbursed. That is the type of policy or guarantee that should be issued when merchandise of that type is being sold. If such guarantees are issued in that way, and if the merchandise is not sold as mothproof, the industry will find that it will be able to sell much more of that merchandise with must less resistance than is now being encountered.

Mr. Ebersold: Do you think the consumer will pay for the mothproofing?

Mr. Freedman: The answer is that we are repeating our orders for blankets that have been mothproofed.

Twentieth
ANNUAL MEETING
AND CONVENTION
OCTOBER 18 and 19, 1940
NEW YORK CITY

The Projectoscope

HENRY ROGER**

The Projectoscope

I AM very grateful to have the opportunity to speak before you and to demonstrate this new apparatus. I have been called a speaker by the chairman. I hope you won't expect too much of a speech because I have nothing prepared, although I know a little about this apparatus.

Before I go to the actual demonstration, I should like to tell you something about the history of this apparatus, which we call the Projectoscope. The name implies what it is—it projects.

After I left the Rockefeller Institute in 1933 I established the Rolab laboratories for photo science. Since that time I have often been called upon to be an expert witness in legal proceedings, and inasmuch as I am a microscopist, the court often has asked me to show certain things as actual proof. Naturally, it is very difficult to show something under a microscope to an audience. You perhaps know that very often the court does not accept photographs as evidence. The court always prefers to see the real object.

In order to show the real object we have to have something to show it with. This problem played in my mind for quite a while. I said to myself, "Well, here is something for thought,"—the Projectoscope was the result.

Very often we have to show living material. I have been called upon to give evidence on conditions of skin in connection with cases of false advertisements by cosmetic firms. You may perhaps know that it is very difficult to photograph skin. The blood is circulated through the capillaries in the skin, and these seem to expand and contract periodically in the rythm of the heart beats. For that reason, one has to take instantaneous snapshots, and that is always difficult because you have to have plenty of light. In fact, you need such a strong light that you may almost burn a hole in the skin. Of course there are a number of devices to cool the heat down. The question still remains whether or not the photographs will be accepted as evidence by the court.

To make the story short, by means of this apparatus one is enabled to show the actual skin on the screen, as I shall demonstrate to you later.

Further developments have been made on the Projectoscope. For instance, this attachment here. While the apparatus is a projection machine, at the same time it photographs, so that the same image which you see on the screen can also be recorded on a photographic plate or film. Actually, the photographing of small objects with this machine is so simple that any person without any experience at all can take a photomicrograph. I know of quite a number of professional photomicrographers who charge $150 to $200 for a photograph of this sort. With this apparatus it is very easy to take such photographs, by simply pressing a button.

With ordinary photomicrographic projection the specimen which you put under the microscope is generally transparent and quite a complicated equipment is needed. As you perhaps know, such an equipment is quite expensive. Many subjects don't lend themselves to this sort of projection. First of all, the material has to be prepared and mounted for microprojection. With this apparatus, nothing has to be prepared and the objects don't need to be transparent. Any object, for instance, this rag, is just held against the aperture of the Projectoscope and so is projected on the screen.

As to the magnification, that, naturally, depends upon the distance of the instrument from the screen. We have a number of lenses available of various focal lengths. The higher the magnification, the shorter the focal length. There are two sources of light in the Projectoscope arranged at a forty-five degree angle with respect to the optical axis of the lens. The lens, naturally, is in the center between these two light sources and the only limitation of magnification is the space available between the object and the lens. In other words, if the lens is too close to the object, there is not room enough to get the light upon the area which is to be enlarged. That is really the only limitation to the magnifying power of this machine.

This particular apparatus, being one of the first ones

*Presented at meeting, New York Section, October 27, 1939.
**Rolab Photo-Science Laboratories.

constructed, may serve for our demonstrations. On the latest models the light sources are stronger. There are only two 100 watt lamps which give a strong enough light upon a small object area, about half an inch in diameter, this area is then magnified on the screen.

The lens here, being standard, is a two and a half inch objective. Naturally, I could change this objective to one with a shorter focal length and the magnification could then be higher. If I take a longer focal length like this, a three-inch, the magnification is not as high. The proper choice depends somewhat upon what I want to see. For instance, if I want to project a small area on a piece of fabric, I require relatively high magnification, with a surface diameter of only half an inch. However, there may be the occasion to project something larger, perhaps a postage stamp, with a relatively larger surface area. In this case I have to use a lens with a longer focal length covering the whole field of the stamp.

I should like to explain a few more details of this apparatus. The upper part of the apparatus can be raised and lowered. There are a number of electric switches in the base. One switch turns the apparatus on and off. This is a combination switch of the double throw, double pole type, which operates this light and at the same time operates the light in the Projectoscope, both alternately. Then there are two switches here which operate each single light unit separately. I can use one beam of light or both beams of light, depending upon what I want to see. For instance, if I have a piece of fabric and want to see the relief of the threads, I would only use one light. If I want to see the pattern and some of the other details I would use both lights.

There is a forty-five degree mirror in here which throws the light up, and the other mirror in this turret throws the light out. Actually, I could have screens all around the place and could throw images all around at a 360 degree circle.

For photography, I have a ground glass in front of the turret which is at the same time a protection, preventing dust from falling into the apparatus. When the image is produced on the ground glass it would automatically be focussed on the plate or film which is here on the photographic attachment. Naturally, this attachment may be taken out, as you see.

The apparatus can also be tilted. If you have objects which are difficult to move you can tip the apparatus over upon the object.

Some of the new apparatus will have the same opening here which is now on top (indicating turret) so that this turret may be used in this position. In this case I have only a primary reflection and not a secondary reflection. This is sometimes important if reading matter is projected on the screen. At the present, double reflection reading matter would be reversed.

The apparatus can easily be opened. (Indicating.) Its construction is really very simple. I have two light sources and two condensers. In this demonstration model, in order to be able to project both, small areas and large areas, I have two condensers of different diameters. Generally, the apparatus comes with only one size of condensers. It is a very good illuminating system. You have the condensers here, the lamp here, and the reflector with a high reflective index.

The lens, as you see here, can be moved back and forth from the outside. In this Projectoscope, because of the camera, this flexbile shaft is convenient.

(Projection.) Here I have a piece of half-tone print. I will put this in the holder and show you, first, the sharpness of the projected image.

(Projection.) I would like to show you my own skin. Notice when I speak the skin moves. (Laughter.)

You probably noticed that I didn't need to go away quickly; because the beam of light is cooled, and I could keep my face on this apparatus for half an hour without burning.

(Projection.) I should like to show you now your subject of interest—textiles—by just taking this rag and holding it against the apparatus. If you were closer you would see every detail.

(Projection.) I will take my own necktie and show you how it looks. You may perhaps see from this picture how much I paid for the necktie. (Laughter.)

I have here an additional apparatus which I would like to demonstrate to you. It looks almost like a small slide projector which is used for two by two inch slides. In fact, I have a few such slides here (Kodachromes). I could show you these with this apparatus except that I have to put a lens in front, like the lens here. However, I will just use the lighting system which is of the same type as the one inside. This attachment is a transilluminator. When I attach it in front of the diaphragm I have two illuminations: the forty-five degree oblique illumination which meets the image here, and this transillumination which goes through the object. I can use both of them intermittently.

(Slide.) I would like to show you a few pieces of different kinds of fabric. This is a piece of taffeta. This is with one light on and this with the other, illuminated separately from both sides.

(Slide.) I now show you the other type of illumination so you may see how both could be used to examine a small area of fabric.

(Slide.) This is a small piece of velvet. I mounted all these specimens between two pieces of glass. This is probably the simplest and most convenient way for these demonstrations. You obtain quite a different picture.

. . . Mr. Roger next showed a number of slides of various textiles and papers . . .

Naturally, I can also show lantern slides with this attachment in place on the Projectoscope. (Slide.) If I

would change the lens in this apparatus you would be able to see the whole slide. As it is now, you only see the central area of the slide. But it may serve to give you the idea.

Any type of object can be seen with the Projectoscope. I have here a few minerals, which also show very nicely with this apparatus.

. . . Mr. Roger showed several mineral slides . . .

And now you may see my thumb (see finger print, useful for criminal identification).

I just want to show you how this image looks on the ground glass. For photography, naturally, you don't need to darken the room. You see this piece of paper which I move in here. You could eventually use a magnifying glass to get a very sharp focus. After you have this sharp in focus the only thing left to be done is to put your plate in there—here is a plateholder—and press the button, and it will be recorded on the film or plate. If there are objects under the microscope which are very dark, or which have a certain depth like these minerals, you would not be able to get it all in focus at one time. What you would have to do is the same as in ordinary photography. You would have to reduce the iris diaphragm to F-36 or F-44. One cap of these ventilators here can be taken off and replaced with another cap provided with a flash bulb and a reflector. In this way, the flash can be released from one of the switches here, depending upon which side it has been attached to. The other illuminating system may be used for focusing. In this way it is a very simple matter to take flash pictures of small objects.

Here are some of the photographs which we have taken with this apparatus. I will leave them here so that you may see them after the meeting is adjourned.

Perhaps there will be some suggestions as to how this apparatus could be used for textiles and for color.

DISCUSSION

Mr. von Bergen: Can you attach a microscope to it?

Mr. Roger: Well, that wouldn't be necessary. This *is* a microscope.

Mr. von Bergen: How far can you go with your enlargement?

Mr. Roger: Depending upon the lens I am using, I could probably go up to about 300 or 400 times. It is only a question of how close I can get with the lens to the object and still get sufficient light from the sides. In other words, if the working distance of the lens is too short, I won't be able to get the light on the object. That is the only limitation.

Mr. Rubecker: How much does the machine cost?

Mr. Roger: The list price is $175, that is without the photographic attachment.

Member: Has that just one objective?

Mr. Roger: Just one objective is included in this price.

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Twentieth

ANNUAL MEETING AND CONVENTION

HOTEL COMMODORE

NEW YORK CITY

OCTOBER 18TH AND 19TH, 1940

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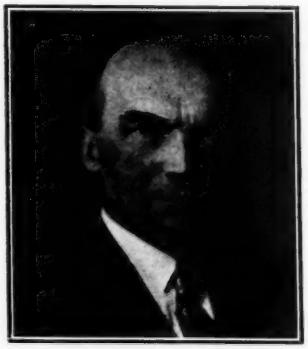

J. ERNEST MEILI

Chairman, Banquet Committee

MANY years spent in the textile industry, both in the mill and with chemical manufacturers has gained for Dr. J. E. Meili, of the Sandoz Chemical Works, a wide and valuable experience and many friends and acquaintances. He is particularly well suited for the position of chairman of the banquet committee after two years' experience in arranging the dinners and speaking programs for the monthly meetings of the New York Section. He has been an active member of the New York Section for considerable time and at present holds the office of vice-chairman. The names of the members of Dr. Meili's committee appear at the left.

Am Dyestuff Reptr. 29 43(1940)

The Scouring Action of Soap

and the

Modern Sulfonated Textile Auxiliaries

DR. J. DAVIDSOHN and A. DAVIDSOHN*

TODAY in the age of advanced technique of scouring it must be regarded as necessary that the technician be familiar with the properties of the scouring agents, especially soap, in order to be able to decide what scouring agents to use and how to apply them. By the same token the textile technician, who is using soap and the modern sulfonated products in his wet processes should possess a certain degree of theoretical knowledge of the efficiency of such agents. It is proposed here to convey this knowledge in an easily understandable manner and to enable the man of practice to interpret the many scientific papers about scouring action, which have been published in the various journals. It is obvious that only the most important problems can be discussed in one article.

WHAT IS THE SCOURING ACTION OF SOAP?

It has been assumed previously that the alkaline component of soap would saponify the fatty parts of dirt, but this explanation is not correct, because unsaponifiable fatty substances and other dirt particles are also removed by soap. Furthermore the alkali of the soap even if it were present as hydrolytically dissociated alkali, would not even be sufficient to saponify the saponifiable neutral fats. We shall demonstrate later the role this alkali of the soap really plays.

Krafft[1] drew attention to the emulsifying properties of soap and for the first time demonstrated the existence of alkali and fatty acids side by side, through hydrolytic dissociation, which fact he makes responsible for the emulsifying properties of soap. This theory of Krafft is borne out by the well-known fact that those soaps, which are strongly dissociated hydrolytically at ordinary temperature (soaps from olive oil, resins and others) are very effective also in cold water, whereas soaps which are only soluble in warm water exhibit inferior scouring properties in cold water. (Soaps from stearic acid, palmitic acid etc.)

In the following we shall try to show that emulsification is not only brought about by hydrolysis, but that emulsification is dependent on the constitution of the soap compound. The same should be true of the modern sulfonated products.

Very interesting contributions about the special properties of soap in aqueous solution have been made by H. Fischer[2]. He points out that the emulsifying power (emulsions in water) of a compound such as soap is dependent on its properties in water. In that way such emulsifying substances are so-called emulsoids, which means substances which in colloidal solution absorb water in their inner structure. Such soaps which form liquid systems with water—"water dissolved in soap"—have especially good emulsifying properties, such as the oleates and linoleates. The lowest members of the fatty acid series produce "true solutions" as sodium soaps and therefore do not emulsify. The higher we go in this fatty acid series the closer to soap are the sodium salts of these acids. In the case of the lower fatty acids a small rise in temperature is sufficient to destroy the emulsions, because the colloidal solution changes into a "true solution." The sodium soaps of the higher fatty acid, such as palmitic, stearic acid, etc., do not emulsify at lower temperatures. However, as soon as the temperature is raised to a point where these soaps represent the system "water dissolved in soap," stable emulsions are produced. If the temperature exceeds a certain maximum the emulsion is again destroyed and the oil to be emulsified is precipitated out again. A large percentage of the fatty acid of cocoanut oil acts in the same manner as the representative of the lower fatty acids. This is the reason why cocoanut oil soaps emulsify well in cold water.

On the other hand it is necessary that the alkali soaps of the *higher* fatty acids be in a *liquid-colloidal* state if they are to emulsify. This as already mentioned can only be achieved by raising the temperature.

The mentioned laws refer to sodium as well as potassium soaps. Because potassium soaps are generally more water soluble and at the same temperature more liquid than the analogous sodium soaps, higher soap concentrations, lower temperatures or the use of a higher molecular soap is necessary in order to produce a stable emulsion with potassium soaps.

In order to obtain a stable emulsion with a low molecular potassium soap, a higher concentration is necessary. Here also a slightly higher temperature would cause the destruction of the emulsion, but the potassium soaps of the higher fatty acids which produce more liquid systems in the presence of water than do the corresponding sodium soaps are emulsifiers at ordinary temperature, whereas the cor-

*Consulting Chemists, Palestine.

responding sodium soaps do not form emulsions at this temperature. At this point the general question must be raised: which compounds have to be regarded as possessing the properties of soap? The soap—sodium or potassium salts of fatty acids—contains an inactive and an active part in the molecule. Therefore we speak of a polar-structure of the soap molecule. The inactive part is composed of methyl groups of the carbon chain of the molecule, and this is water repellent (hydrophobe).

The active part of the molecule, which is hydrophyl (water absorbing) is composed of the COOH-fatty acid group or the "carboxyl" group. In the case of soap the alkali is linked to this group. In the case of the modern sulfonated products this active part is composed of the SO_3H group (sulfo-group) or another similar group. For this point of view the theories of Fischer are again explained and verified, for if the two polar groups are too close together, as is the case with acetic acid, solubility in water is too great and a colloidal solution cannot be formed. If they are too far apart, or in other words, if too many methyl groups are present, the solubility is too low.

That the soap solutions are to be regarded as colloidal solutions is also proved by the early observation of Krafft and Fehlen (Berliner Bericht *1895*, 2573, *1899*, 1584), that soap solutions do not produce a higher boiling point of the solubilizing liquid, in this case water. The property to gelatinize also points towards the colloidal character of soap solutions, also the impermeability of membranes which is to be observed also in soap solutions. When dialyzed it is shown that the alkali soaps up to valeric acid are dialyzable, while stearic acid soaps do not pass the membranes. The other soaps are only partly dialyzable.

Other properties of soaps to be mentioned are the swelling property and also its adhesive capacity for water. This capacity is very great and is up to 2000 mol of water for 1 mol of soap. Hardy[3] found a proportion of 1 to 1500 for gelatine, which is less than for soap, also the adhesive capacity of gelatine is the same even at very low temperatures. This strong adsorption of water is based on the peculiar stringy structure of the soaps which can be observed under the ultramicroscope. This was first discovered by the researches of Zsigmondy and Bachmann[4], McBain[5], Thiessen[6] and others. Most of this adsorbed water can be mechanically removed by pressing. The true degree of hydration—2,16-2,60—has been determined by Lederer[7].

In this connection the adhesive capacity of soap solutions for solid and liquid materials should be mentioned. This property, tested by various investigators, is of special importance for the scouring efficiency of soap. Tests were made to ascertain the properties of soap solutions to carry particles of carbons through filterpaper[8]. These tests led to the conclusion that we have to do with a protective effect of soap in filtering, otherwise it would be impossible that dirt which has been loosened from fabrics would not again be held back by the fabric during the washing or scouring process. Many investigators have paid particular attention to this fact and they have also considered the size of the emulsified particles[10].

In this connection it is interesting to ask how the removal of dirt from the fabric to be scoured is effected. As described above, the dirt is loosened and the soap solution prevents the dirt from being deposited again through its protective colloidal action[11]. W. Haller[12] explains emulsification in connection with scouring action, and the cause of the emulsification as related to the scouring effects of soap with the lowering of surface tension and the electric charge. The surface tension is equivalent to the amount of force which has to be extended in order to enlarge the surface of the liquid or solution to a certain degree. For instance, if it is attempted to enlarge the surface of a drop of oil by shaking it with water and thus to break it up into many small droplets, the surface tension exerts a certain resistance. Hence a certain force is necessary in order to emulsify the oil. If the emulsion formed is left to itself the small droplets combine again to form larger drops under the influence of the surface tension, which tries always to minimize the surface of separation: oil—water.

If oil is shaken with liquid other than water it is more easily emulsified the smaller the surface tension of oil is in comparison with that liquid. One of the best media to lower the surface tension of water is a soap solution. The explanation of this property of soaps leads to the nucleus of the problem of emulsions. The phenomenon of surface tension shows that a certain force is necessary to enlarge the surface of a liquid, in other words, to bring new molecules from within the liquids into the new surface layer to be formed. This is understandable if it is realized that single molecules attract each other. Therefore they will resist an attempt to disrupt this mutual attraction and to be thrown out into the open surface. This resistance is expressed as the surface tension. In the case of oil and water therefore, the water molecules attract each other much more than they would attract the oil particles in whose neighborhood they are brought.

In the same manner as these oil particles, the hydrolytically dissociated fatty acid part of the soap exhibits only a low affinity to water and is therefore insoluble by itself. Therefore the solubility of soap is due to the fact that soap is a salt (dissociated in water), the fatty acid component being dispersed by a low electrical charge and held in solution, as is the case with colloidal substances. This electrical charge is due to ions, which are formed by hydrolytic dissociation of the alkali. So we see that it was also wrong to overestimate the importance of the so-called dissociated alkali. The old experiences and theories were revived in connection with the researches in the colloid chemical field. Besides the emulsion phenomenon proper, the wetting capacity of soap solutions is important[13].

This leads us to the two terms of *Interfacial tension and capillarity*. For the explanation of interfacial tension, the following might be a good example: If a narrow tube which is open at the top and filled with oil is put in water, the oil, despite its lower specific weight, does not flow into

the water because it is held back by the strong interfacial tension which exists between oil and water.

If this experiment is repeated by dipping the tube into soap solution instead of in water, the oil flows out and is replaced by the soap solution[14]. Now this phenomenon of the lowering of interfacial tension is used by Hillyer to explain the scouring action. In order to understand this theory, however, capillarity must be considered briefly. Also the phenomenon of permeating of liquids through pores and fibers must be explained. If a very narrow glass tube is dipped into water, we see that water rises in the tube up to a certain point against its own gravity. The narrower the tube is, the higher will the water rise. It is therefore a certain force by which the water is drawn into the tube; this force is called capillarity.

Many materials exhibit the same phenomenon as does the glass capillarity, as for instance, blotting paper, clay, textile fibers and also the pores of the skin. Capillarity is explained by adhesion or the adhesive effect of the surface of pores upon the liquid.

Let us recall once more the experiment cited above. We have seen that soap solution lowers the interfacial tension by capillarity. The soap solution permeates the fibers of the fabric or the pores of the skin and lowers the surface tension between the oily and fatty dirt particles. In this way they are loosened, emulsified or suspended. Here we have a combination of the wetting power and emulsifying property of the soap solutions.

Other investigators propounded different theories about wetting power and emulsifying action in connection with scouring. (Geppert[15] and Klimburg[16].) Geppert regards emulsification not as a cause but as the result of the scouring action, and he thinks that scouring is based upon the action on the surface, to which the dirt clings and not upon the dirt itself. According to Heermann[17] scouring action is the sum of wetting power, foaming, emulsifying power and adsorption capacity.

Scouring action is affected by the addition of inorganic salts. Many workers have investigated this field with the emphasis on additions of an alkaline nature.

It has been found that the scouring action of soaps can be increased by the addition of alkaline salts. A number of Russian and American investigators have worked in this direction. Roschdenstwenskij, Iwanowa and Boltunowa[18] used for additions: soda ash, sodium phosphate, caustic soda and waterglass, and found the optimum of scouring action to be at a pH of between 10 and 11. This checks with the investigations of Rhodes[19] who found the optimum at pH 10.7. Baker[20] and others found the same values. The reason why these findings have not been generally made use of is due to the fear to increase the alkaline content to a point which would be harmful to the fabrics. This fear was only dispersed when Bleyberg and Lettner[21] and Tjutjunikow[22] and others demonstrated that the pH value which is due to hydrolysis is not considerably changed by the alkali present in good soap, as well as through additions of alkaline nature. As demonstrated before by measurements of conductivity, pH numbers, etc., the reaction of a mixture of soap and alkali is not the sum total of the reaction of the components. One of the two authors (J. Davidsohn) has published a number of articles about the hydrolytically dissociated alkali, in which he reported on the determination of the pH value and on the unfounded fear of the so-called free alkali[23]. W. Prosch[24] wrote about tests to determine the scouring action. Quoting a few literature references, he sums up as follows: so far as it can be said now, no straight deductions can be made as to the scouring action, because the soap reacts differently toward the various types of dirt as well as different fabrics. True enough, certain conclusions can be drawn as to scouring action by determining such phenomena as emulsification, adsorption, wetting and so on, but these methods are not yet standardized, so that comparisons are not possible especially if they are made by different investigators. Lederer[25] therefore claims that for the determination of scouring action a practical test will have to be made. Many experiments have been made in order to find and introduce methods for the determination of scouring action. Tjutjunikow[26] has constructed an apparatus for this purpose. Other methods to determine scouring action have been proposed by Bosshard and Sturm[27]. They precipitated certain quantities of iron oxide in very fine dispersion upon pieces of woolen fabrics, scoured them according to predetermined conditions and determined the remaining iron. Schwertassek[28] used suspension of carbon and mineral oil on cotton fabrics, scoured them and then determined the whiteness of the fabric with the photometer. Many other methods were used such as by Szegö and Beretta[29], who used vaseline, tallow, linseed oil, oleic acid and carbon. However, none of these methods represents a simple, practical and, most important of all, reproducible method, which would comprise the many ramifications of the scouring effect. It remains for laboratory investigators to work out a satisfactory method, because this cannot be worked out in a plant.

THE MODERN SULFONATED PRODUCTS

It is well known that soaps form insoluble metallic soaps especially calcium (lime soaps with hard water). Without considering the methods of water softening we are more concerned with the modern methods to produce scouring agents, which are not sensitive to hard water. It so happens that the acid group (COOH group) of the soap, which is of importance as to the scouring action, is also responsible for the formation of lime soaps, because it is this group which reacts with the lime of the water. The first product, which was less sensitive to hard water, was Turkey red oil, which is a sulfonated castor oil. Yet it was by far not satisfactory as to the degree of stability to hard water, and the chemists tried to find out what was responsible for the sensitivity to lime. The next thing to be found out was how to improve this sensitivity to hard water. It occurred in these experiments that the free COOH group of the fatty acid was chiefly responsible for the poor stability to hard water, also in a somewhat different manner than in the case of soap. It would be

impractical to attempt to change the COOH group of the soap because this group is responsible for the scouring action of the soap. It is different with the sulfonated products because here the group which corresponds to the COOH group linked to alkali is the SO_3H group, eventually also linked to alkali. The COOH group in the sulfonated products is, to express it bluntly, just superfluous ballast. It has been tried in all sorts of ways and successfully to neutralize the COOH group. Two ways have been tried to do this. One of these consists in "blocking" the COOH group by esterification or other means, the other way is to change the COOH group through catalytical reduction with hydrogen into the hydroxyl group (OH). In other words the fatty acid is changed into the fatty alcohol.

The working principal of these compounds may best be explained by illustrating with some of the products now on the market. As an example for the so-called "blocked" products the well known "Avirol" AH will be cited. Here the COOH group has been esterified with an organic group.

True sulfonic acids are also esterified and aliphatic as well as aromatic groups are being added. Other products of complicated constitution are the so-called condensation products, such as Igepon A (a sodium salt of the sulfonated condensation product of fatty acid and ethionic acid). Its scouring efficiency and fastness to hard water are now well known properties.

A still further development along these lines is the Igepon T, the sodium salt of the amido-compound of oleic acid, and "Taurin" (amino-ethan-sulfonic acid). Naturally not all of this group of so-called "blocked" compounds can be named here.

We will now consider in more detail the sulfonated products in which the COOH group is not present any more as such, but has been changed into a CH_2OH group by reduction. In other words, we are dealing now with the so-called fatty alcohols. By reducing these fatty acids to fatty alcohols, sulfonated products of especially good properties are produced. The resultant compounds correspond to alkyl sulfates or their alkali salts of the general formula $R.OSO_2ONa$, in some cases also true sulfonic acids $R.SO_2ONa$.

The properties of these sulfonated fatty alcohols change considerably with the growing number of *C* in the homologous series $C_rH_{2r}+1SO_4Na_2$. Therefore by proper selection and combination, products can be produced with properties predetermined for any specific use. Generally the following can be said about the properties: wetting properties are excellent, beginning with C_{10}, also emulsifying properties. The combination of surface activity and emulsifying power results in products possessing a scouring action superior to soap. In this connection it is important to note the fatty character of these products. Especially the higher alcohols show excellent finishing properties. They impart to the fiber a nice, soft feel and show the advantage over soap and Turkey red oil of not becoming rancid. The reason for that is the absence of the COOH group. They also differ from soap in that no alkali is hydrolytically dissociated, which is sometimes of advantage if one wants to work in a neutral bath. If necessary it is easy to bring these products to the same pH value as soap by addition of a suitable slightly alkaline "buffer"[30].

Kling emphasizes the fastness to hard water, acid and salt of the fatty alcohol sulfonates. According to him the sulfonated fatty alcohols, being sulfuric acid esters, exhibit sufficient stability to acid for nearly all processes except carbonization. The most common fatty alcohol sulfonates are made from sulfonated technical Cethyl alcohol, Oleinalcohol (Ocenol) and Laurinalcohol (Lorol).

As mentioned before, the most outstanding properties of the sulfonated products is their stability to lime and electrolytes. Besides it should be emphasized once more that practically all of these products do not react alkaline, which is of great importance for many textile processes.

Attention should also be called to the manifold possibilities of combining these sulfonated products with each other. The possibilities of use in conjunction with soap are also many[31].

The question whether and how far these new sulfonated products could substitute for soap cannot be answered as yet and it will take many years of experience to answer this question finally.

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Will the United States Regain Their Lost Trade with Latin-America?

H. O. JOHNSON*

NOW that the war in Europe is an actual fact and not just a threat, Mexico, as well as all Latin-American countries, find themselves cut off from the European sources of supply covering many articles that Germany particularly has been selling at prices many times 50 per cent under those manufactured in the United States.

There are neutral nations in Europe that have always had the inside on certain commodities because of prices, who now find themselves unable to ship to Mexico because of the danger involved, and even though they are able to deliver merchandise here, the increased cost because of higher freight rates, war risk insurance, additional risks that cannot be covered by war risk insurance, and indefinite delivery dates, create a situation that should be most favorable to the American manufacturer who is interested in regaining the Latin-American market that has gradually been slipping away from the United States during the past few years.

Buyers in Mexico tell us that they are finding the supplier in the United States very indifferent towards Mexican business; that they repeatedly get replies to their inquiries saying that the domestic demands in the United States has become such that they are booked up for months to come, and that the sources of raw materials are so scarce that they cannot possibly compromise themselves to anything in the future until they see what is going to develop. In some extreme cases important manufacturers in the United States, who have triple A ratings or better, have failed to reply to telegrams and urgent air mail inquiries from Mexican buyers.

The very prosperity of the United States for the future seems to be based on the ability of the American manufacturers to produce and export, and the logical export market now and for the future is Latin America. It is a fact, of course, that the United States is more nearly self-sufficient than any other large industrial nation in the world, but it is also a fact that we have had many millions of unemployed in the United States for several years past, and it does seem that one way to put these unemployed back to work would be to appreciate the possibilities in developing our export business now that the menace of totalitarian states is temporarily eliminated.

In the case of Mexico, in 1937 they purchased from a small number of European nations a total of $55,000,000 worth of merchandise, most of which could have been purchased in the United States, except for the inability of the American manufacturer to meet prices of these European nations. However, now that Europe is not in a position to supply these demands, it seems a very opportune time for United States to regain this business, and once regained it will be a long time before Europe will be able to get it back on the same percentage basis that they have enjoyed during the past few years.

In a resumé of trade between Mexico and the United States since 1872, the United States enjoyed only 26 per cent of the exports to Mexico in 1872 as against 70 per cent from Europe. However, in 1889, the United States was enjoying 56 per cent of Mexico's imports and Europe only 42 per cent. When war broke out in Europe in 1914, imports from the United States jumped to 70 per cent, and as the war progressed reached 90 per cent, whereas imports from Europe to Mexico became as low as 8 per cent.

When the United States put on her protective tariffs in 1930, our exports to Mexico showed a sharp decline and Europe immediately started to benefit from this condition. From 1934 to 1937, exports from the United States to Mexico hung around the 50 per cent margin, whereas in 1930 exports from European countries to Mexico amounted to sixty some per cent of Mexico's purchases. Now that the conditions resemble those of 1914, it seems that the time is right for the United States to again occupy their rightful position of supplying Latin American markets with their requirements.

It is most unfortunate that the average manufacturer in the United States is either held back by stockholders or management from developing export business, either because of fear of risk involved, or actual lack of knowledge of what the export business means to the economy of the United States as a whole. The policy of so many manufacturers in the United States seems to be one of independence and indifference to export business. It is most unfortunate to note the number of companies attempting to export and insisting that export business must be conducted on the same basis as their domestic business. Many times we have had high salaried officials visiting this market with absolutely no knowledge of the customs of the country, the language, or desire to acquaint themselves with conditions to better the feeling between the consumer and themselves.

On the contrary, Europe has developed the Latin American market in a very systematic way through sending men well prepared and with knowledge of local conditions, ability to speak the language, willingness to adjust themselves and their policies to the market they are attempting to gain. This has been mainly responsible for the increased percentage of business going to Europe right out of our back yard, so to speak, and in many instances on more or less the same price basis with a much inferior quality article than we could have supplied from the United States.

*Secretary and Manager, American Chamber of Commerce of Mexico, Mexico, D. F.

There have been many attempts on the part of the Administration and the public as a whole in the United States in these past few years to overcome the depression, to create employment for the millions who wanted to work, and yet we were neglecting a market such as Mexico —our closest neighbor—who was buying fifty-five million dollars worth of merchandise and many thousands of miles away that should have rightfully gone to the United States and created jobs for a big portion of that unemployed in manufacturing this merchandise and dividends for the stockholders of the industries that could have supplied this material had they made a more intelligent effort to have gotten the business.

Technical Notes—

(Continued from page 30)

Substantive Dyes. This group of dyes has good affinity for Lanital, and colors of the developed class yield shades of good fastness to washing. The affinity of substantive dyes for Lanital is much greater than for wool.

Fastness Properties of Dyeings.

To Light: No variation was found in the fastness to light of dyeings on Lanital compared with the same dyes in the same depth of shade on wool. Dyeings at 20° C. were as fast as dyeings made at 80° C. and 100° C.

To Water: Fastness to water not so good on Lanital as on wool in the cases of Acid, Cloth Fast and Neolan dyes, though the difference is slight as regards the last. Normal dyeings with Chrome colors as good on Lanital as on wool.

To Washing: All dyeings on Lanital found not so fast to washing as those on wool. The difference is not so marked when faster colors are used, such as Neolans or Chrome Fast types.

To Stoving: Dyeings on Lanital generally less fast as compared to similar dyeings on wool.

To Acid and Alkaline Perspiration: Dyeings of all types on Lanital markedly inferior to those on wool.

Dischargeability. Colors dischargeable on wool are readily dischargeable on Lanital, but the whites on the latter are not quite so good.

Dyeing Casein-Fiber-Wool Unions. Satisfactory results were obtained with a large number of Acid, Fullacine and Cloth Fast dyes, which are listed. A number of Neolans were also found satisfactory, as were such Chrome Fast dyes as have already been found suitable for dyeing the casein fiber alone.

The paper as a whole furnishes valuable information, not perhaps readily available elsewhere, on the dyeing properties of this new and interesting fiber.

The Use of Dyes in Photography

(*A. Seyewetz—R. G. Mat. Col.*, 43-513, *Oct.*, 1939).—This is the concluding article of a series by the joint-director of the Lyons School of Industrial Chemistry, in which is explained the methods employed in modern moving-picture color photography, such processes as Technicolor, Kodachrome, Agfacolor, etc., being considered in detail.

Technicolor: In this process three films are exposed simultaneously, the use of appropriate color screens permitting each to be affected by the particular wave lengths for which its emulsion coating has been sensitized. From the developed negatives positives are printed and colored respectively blue, yellow and red. The three monochrome films thus obtained are pasted together with careful registering to give the finished polychrome.

Kodachrome and Agfacolor: With these types an entirely different principle is employed, the coloring taking place during the process of development. The Kodachrome film consists of a backing of transparent cellulose nitrate or acetate, upon which is placed a series of sensitized emulsion coatings, three in number, separated from each other by two layers of transparent gelatine. The sensitized coatings are in the neighborhood of 0.005 mm. in thickness, the gelatine layers rather less, and the thickness of all together should not exceed that of an ordinary film coating. No color filter is required in making exposures with this film.

Developing and coloring after the exposure is a complicated procedure, and the greatest care must be exercised in dealing with the separate coatings. The film is first developed in the regular way, and the reduced silver dissolved out by means of acid potassium permanganate, leaving the unchanged silver bromide in the three coatings. This is next developed in blue-green by treatment in a bath containing a paradiamine and metaoxydiphenyl in addition to the sodium carbonate, sodium sulfite and potassium sulfocyanate employed. Bromine liberated from the reduced silver salt oxidizes the paradiamine in presence of m-hydroxyldiphenyl to form indophenol, which imparts a green color to all places where the silver bromide has been reduced to metallic silver. Residual silver halides are then removed by fixing, and the film washed and dried.

The next step is to destroy the color in the two upper coatings and transform their silver back into a developable salt. This is done by a carefully regulated treatment with hydrochloric acid, in presence of quinone as an oxidizer. Silver in the two upper coatings is changed to chloride, the color being destroyed at the same time. To arrest the action at the proper point, the film is passed into a neutralizing bath. At this point the lowest coating remains green, the two others are without color and their silver converted to the form of chloride.

The film is washed and given another developing treatment which reduces the silver chloride to metallic silver and at the same time produces a magenta-red color (from diethylparatoluylenediamine and paranitrodiphenyl, oxid-

ized by the chlorine) in both coatings. This leaves the lowest coating green, the two upper ones magenta-red.

A similar treatment is next employed to remove the red color and re-transform to chloride the silver of the upper coating, followed by another development which colors it yellow, dimethylparaphenylenediamine and nitro-4-aceto-acetanilide being employed for this purpose.

Residual silver is finally removed by treating the film with a mixture of potassium ferrocyanide and sodium hyposulfite, leaving only the three colored layers.

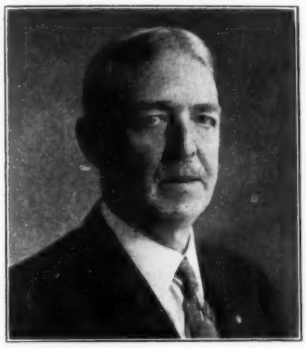
In case of the Agfacolor film, these various color producing compounds are incorporated in insoluble form in the appropriate emulsions, and the colors all formed at once in a single developing bath.

TRADE NOTES • NEW PRODUCTS

OBITUARY

BENJAMIN C. BLOWNEY

BENJAMIN C. BLOWNEY, district manager at the Cincinnati office of Geigy Co., Inc., died of a heart attack on January 15th in Milwaukee. He had made a business call in that city and, upon returning to his car, was stricken. He was 71 years of age.



Mr. Blowney was a native of Waukegan, Ill., was educated there and entered the dyestuff industry in Chicago. He was associated there with Schoellkopf, Hartford & Hanna Co. and later with the National Aniline & Chemical Co. In 1904 he was sent to Cincinnati as branch manager for that company. On February 1st, 1921, he became district manager in that city for the Geigy company.

Mr. Blowney was active in the affairs of the Mid-West Section of the American Association of Textile Chemists and Colorists and was councilor from that Section.

His home was at 2486 Observatory Road, Hyde Park, Cincinnati, Ohio. His wife and only daughter having predeceased him, he is survived by a sister.

ALEXANDER ALEXANDER

ALEXANDER ALEXANDER, chairman of the board of directors and former president of National Starch Products Inc., died January 10 at Miami Beach, Fla., of a heart attack. He was 68.

Mr. Alexander built up from practically nothing a business organization which has developed into the National Starch Products Inc., one of the world's largest producers of commercial adhesives, and one of eight companies engaged in the manufacture of corn starch in the United States. He was president of this organization, which was formerly known as the National Adhesives Corporation, until August, 1939.

His wife, Josephine Alexander, died three years ago. Their only surviving child is a daughter, Mrs. Frank K. Greenwald.

• CENTURY OF GROWTH

The year 1940 marks the 100th birthday of Emery Industries, Inc., of Cincinnati, Ohio. Thomas Emery founded the company in 1840 in a one story plant on Sycamore Street, Cincinnati, which was known as "Thomas Emery's Lard Oil Factory." As the name indicates, lard oil, then used in illuminating lamps, was the company's first product. Within a few years the company added the manufacture of candles and developed the stearic acid candle that burned longer and held its shape better, thus replacing to a great extent the unsatisfactory tallow candles of the time. The plant was then known as the "Emery Candle Company" and as it grew in importance new plants were needed. In 1849 the company moved to the edge of the Ohio River to take advantage of the better transportation facilities but recurring floods, culminating in the great flood of 1884, indicated that this was an unwise move. In 1887 the plant was moved to its present location in the soap and tallow district of Ivorydale, a suburb of Cincinnati.

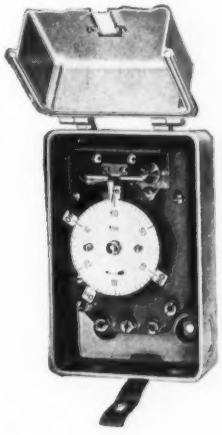
Today the company has grown to be one of America's largest makers of stearic and oleic acids and has contributed dozens of new products to the advancement of the chemical industry. One of the most important developments of the company was the Twitchell fat splitting process developed in 1890 by Dr. Ernst Twitchell, head of the Emery laboratories. This development is still considered one of the outstanding fat splitting processes and Twitchell reagents are important among the products of Emery Industries.

The last decade has witnessed new improvements in fatty acid materials, new Twitchell products, the Sanitone cleaning process and the Duratone laundry method.

Facts concerning the history of Emery Industries, Inc., together with a discussion of its products are presented in a new booklet entitled "Emeryfacts." Copies are available upon request to the company.

• NEW CYCLE TIMER

The R. W. Cramer Co., Inc., Centerbrook, Conn., announces production of a new cycle timer designed for use on alternating current circuits to continuously close and open a single circuit at any pre-set operating interval or to alternately close and open two circuits at any pre-set operating interval, one circuit opening instantaneously with the closing of the other and



vice versa. Among its uses are: to automatically control the timing operation of coal stokers, to periodically start and control the duration of operation of electrically operated machinery, to automatically control the day and night operation of thermostats, etc. Complete details regarding this timer are available from the manufacturers.

● YOUNG ANILINE OFFICE AND WAREHOUSE

Announcement has been made that, effective January 1st, the Paterson office and warehouse of the Young Aniline Works is now located at 50 East 13th Street, which is one block from the corner of 5th Avenue and River Street. There is no change in the Paterson or New York telephone numbers.

● NEW EASTMAN BOOKLET

The Tennessee Eastman Corp., a subsidiary of Eastman Kodak Co., 10 East 40th Street, New York City, has recently issued a booklet entitled "The Story of Eastman Acetate Rayon" which illustrates photographically the process of manufacturing acetate rayon, and includes a chart showing the manufacturing steps. Also included are fabric swatches which show the versatile effects which can be obtained through the use of Eastman acetate rayon yarn or Teca staple fiber, either alone or in combination with other fibers. The covers of the booklet are laminated with Kodapak and the transparent pocket holding the swatches is made from the same material. Kodapak is a cellulose acetate sheeting made from the same basic substance as the acetate rayon.

Copies of the booklet are available without charge to the heads of college home economics departments, and to advertising managers, fabric and dress buyers and supervisors of educational departments in department stores.

● NEW FILTER PAPER

The Enthone Co., 442 Elm Street, New Haven, Connecticut, has announced the sale of a new high strength paper for filter presses, which is claimed to possess the highest wet strength of any paper on the market for this purpose. The paper possesses exceptionally long fibers, and in addition has been given a patented wet strength treatment.

The paper, costing less than a cent a sheet, is placed against the filtering canvas or screen and the filter cake deposits upon the paper, thus enabling rapid cleaning of the canvas by merely removing the filter paper carrying away the filtrate.

It is stated that the high strength of the paper, both wet and dry, obviates any danger in tearing, both in placing the paper and removing it from the canvas. The paper being only a few mils thick, allows tight locking of the plates and frames to prevent leakage.

The paper is fast filtering and tests by the supplier has shown it to possess high strength in acid solutions with pH values as low as 2.0 and in strong caustic solutions up to 15 oz. per gallon of caustic soda.

Some of the advantages claimed for the use of this paper are: fast cleaning of filter presses, more thorough filtration, longer life of canvas and tight sealing of plates and frames.

Samples and literature can be secured by writing the manufacturer for Bulletin No. 78 stating the make and plate size of the filter press.

● DEVELOPS WARMTH TESTER

After several years of research and development work, the United States Testing Company has completed the building of a machine for measuring the warmth qualities of materials. There has been a number of instruments developed in recent years for measuring the thermal conductivity or heat transmission of materials. Some instruments incorporated temperature changes and air velocity in their readings.

The machine on which experimentation work has just been completed, embodies the features of the present instruments plus a number of innovations established and perfected by the Testing Company. It is stated that the Warmth Tester actually determines the warmth factor of materials under all types of conditions.

The Warmth Tester is of the guarded hot-plate type with duct systems equipped with blower, refrigerator unit, and heating coils, together with suitable control units so that a wide variety of weather conditions can be created and accurately controlled. The various units of the Warmth Tester are adjusted to give a weather condition above the upper exposed surface of the sample that is representative of those to which it will be subjected in the course of normal use.

● ADDRESSED A.I.C.E.

Cyril S. Kimball spoke before the student branch of the American Institute of Chemical Engineers at Cooper Union on December 20th on the subject "A Short Trip around a Consulting Chemical Laboratory." He discussed the diversified problems of the consulting chemist, giving illustrative stories to bring out his points.

● ADDRESSED A.C.S.

Foster Dee Snell addressed the Connecticut Valley Section of the American Chemical Society on January 13th at Springfield, Mass. His subject was "Some Factors in Detergency." Dr. Snell outlined the four factors which so far as known control the efficiency of a detergent and showed their applications in many types.

● HEADS FUND CAMPAIGN

John A. Brown, president of Socony Vacuum Oil Company, Inc., has accepted the chairmanship of the Greater New York Fund's 1940 campaign. Announcement of his acceptance was made by Winthrop W. Aldrich, chairman of the Business Council of the Fund at a meeting of the executive committee, January 4.

The new chairman succeeds Thomas I. Parkinson, president of the Equitable Life Assurance Society of the United States, who was leader of the 1939 drive conducted for the Fund's affiliated voluntary social welfare and health agencies.

● CORROSION-RESISTANT ALLOY SHEET

Rolled sheets and plates of Hastelloy alloy C, a corrosion-resistant nickel-molybdenum-chromium-iron alloy, can now be furnished by Haynes Stellite Company, a Unit of Union Carbide and Carbon Corporation. Until a short time ago, this alloy was commercially available as castings only. Now plates weighing up to 100 lbs. each can be made, and the alloy can be produced in practically any commercial thickness.

Advantages of this alloy are said to be that it effectively withstands strong oxidizing agents such as acid solutions of ferric or cupric salts, and aqueous solutions containing chlorine or hypochlorites. It is further said that it is one of the few metallic materials that will withstand the corrosive action of wet chlorine—at room temperature, its rate of penetration in water-saturated chlorine vapor is only 0.038 in. per year. It is claimed that Hastelloy alloy C also has good resistance to hydrochloric acid up to 50 deg. C. and to sulfuric acid at temperatures up to 70 deg. C. if the concentration is over 50 per cent, or up to boiling if the concentration is under 50 per cent.

In rolled form, the alloy is said to have a tensile strength in excess of 75,000 lbs. per sq. in., and an elongation and reduction of area of about 15 per cent. These good physical properties, coupled with the alloy's outstanding resistance to corrosive chemicals, make it an engineering material of unusual interest. Sheets and plates of the alloy are already being used in several types of processing equipment involving severe corrosion problems. Further information about Hastelloy alloy C sheets can be obtained from Haynes Stellite Company, Kokomo, Indiana.

● NEW PLANT SITE

The Pennsylvania Salt Manufacturing Company announces the purchase of two tracts totaling 50 acres on the Delaware River at Cornwells Heights, as a site for its new $2,000,000 plant. The plant will replace present Philadelphia operations at Delaware and Oregon Aves.

The site consists of two pieces of land, one the former Traylor Shipbuilding property owned by the Carleton Company, a subsidiary of the Traylor Engineering & Mfg. Company, Allentown; and the other is part of the former Badenhausen Corporation. The properties extend from State Road to the river. Cornwells Heights immediately adjoins the northeast boundary

of Philadelphia at the upper end of Torresdale.

Research laboratory and pilot plant operations, which have been cramped, will be moved to the new site. Executive, accounting, and sales offices will remain as at present in the Widener Building. The Company has other plants at Natrona and Easton, Penna., Penn Yan, N. Y., Wyandotte, Michigan; and Tacoma, Washington.

• ELECTED PRESIDENT

Charles P. Gulick, of 135 South Munn Avenue, East Orange, N. J., chairman of the board of the National Oil Products Co., Harrison, N. J., has been elected president of the Manufacturer's Club of West Hudson County, N. J. Mr. Gulick was also recently appointed vice-chairman of the Industrial Practices Committee of the National Association of Manufacturers.

• KELCO REPRESENTATIVE

W. R. Kiely, Sales Manager of Kelco Company, manufacturers of Keltex, thickening agent for print paste, announces the appointment of J. R. Moss as representative in Georgia, South Carolina and Florida, effective as of January 1, 1940. Mr. Moss will make his headquarters at Atlanta, Ga.

• NICKEL FABRICATION

F. G. Flocke, of the Development and Research Division of The International Nickel Company, Inc., gave a talk on "Fabrication of Monel, Nickel and Inconel in Solid and Clad Plate Construction" before the Northwest Chapter of the American Welding Society at the Minnesota Union, University of Minnesota, in Minneapolis on Tuesday evening, January 16.

Mr. Flocke's discussion was illustrated with slides showing new developments in the welding of Monel, Nickel and Inconel in solid and clad plate construction.

• JESSOP STEEL RELEASE

A new 24-page booklet which contains useful information on Jessop Silver-Ply stainless-clad steel for both buyers and fabricators of stainless equipment, has just been issued by the Jessop Steel Co., 501 Green St., Washington, Pa.

Silver-Ply is a composite sheet or plate consisting of a layer, or ply, of stainless steel which has been firmly welded to a mild steel backing during the rolling process. The new booklet describes its advantages over solid stainless, how it is manufactured into sheets and plates, and how it is fabricated into finished equipment.

Two pages of photographs illustrate typical installations of equipment fabricated from Silver-Ply. Proof of the strength of bond between cladding and backing is said to be contained in two pages describing tests made on Silver-Ply sheets and plates. Also included is a full page table showing the physical properties of Silver-Ply after welding.

Of particular interest to users of stainless equipment are four pages which give the corrosion resistance of various types of cladding to almost every substance encountered in the process industries. Substances are arranged alphabetically for easy reference. The oxidation or heat resistance of various types of cladding are also included.

Seven pages have been devoted to the fabrication of Silver-Ply making this section a practical handbook for equipment manufacturers. Fabricating methods described include cold fabricating, deep drawing, gas cutting, riveting, welding, soldering, grinding and polishing. The description of welding procedure is amply illustrated with line drawings.

A free copy of the new booklet will be sent to anyone requesting it on his company letterhead.

• HERCULES DIVIDEND

The Board of Directors of Hercules Powder Company on December 27th, 1939, declared a regular quarterly dividend of 1½ per cent on its preferred stock. The dividend is payable on February 15th to stockholders of record on February 2nd.

• NEW TEXTILE LABORATORY

Fred A. Mennerich announces the opening of a new laboratory devoted exclusively to the microscopical investigation of routine and research problems in the textile field. He is specializing in microscopical fiber identification and composition, wool grading, denier analysis and other tests which are solved with the aid of a microscope. Another specialty is the taking of photomicrographs to record the defects or show the perfect construction of yarns and fabrics, and to compare the size, shape and evenness of fibers as they appear in longitudinal or cross-section mounts. He has equipment for taking photomicrographs from magnifications of 2 times to 3000 times.

He has given lectures before various textile associations and has had many papers published in the field of textile microscopy on such subjects as: "Shape and Size of Silk Filaments as Related to Two-Tone Dyeing," "Microscopy of Rayon Filaments," "Rapid Measurement of Cross-Section Diameters," "Correlation of Diameter and Denier for Rayon Staple Fibers," and "Microscopical Analysis of Mixed Textile Fibers." He can account for the measurement of 372,500 diameters of textile fibers, which he has made for various routine tests or research problems.

Mr. Mennerich is a graduate of the University of Wisconsin and a fellow of the New York Microscopical Society of which he has been secretary for three years. He has been conducting classes on textile microscopy for several years for members of this society at the Museum of Natural History. Much of his present experience in the textile field was gained at the United States Testing Company where he was the chief microscopist for four years. His technique was first developed in the two years that he spent on textile microscopy problems for the theses for his degrees of Bachelor and Master of Science in chemical engineering.

His laboratory for textile microscopy and photomicrography is located at 42 Roosevelt Avenue, Jersey City, N. J. Mr. Mennerich will gladly send literature and price list on the work that he is doing.

• MICROFILM SETS OF PERIODICALS

The Committee on Scientific Aids to Learning, President Conant of Harvard, chairman, has made a grant to cover the cost of making a microfilm master negative, on the most expensive film, of sets of volumes of scientific and learned journals.

This permits the non-profit Bibliofilm Service to supply microfilm copies at the sole positive copy cost, namely one cent per page for odd volumes, or a special rate of one-half cent per page for any properly copyable 10 or more consecutive volumes.

The number of pages will be estimated on request to: American Documentation Institute, care offices of Science Service, 2101 Constitution Ave., Washington, D. C.

• THE WORD "NYLON"

Derivation of the word "nylon" was described recently by officials of the du Pont Company, who said it is a generic word coined by the company and is not a registered name or trademark. They asserted the sequence of letters composing the word has no significance, etymologically or otherwise.

"When the polyamides were developed," said the officials, "it was apparent that no short, 'catchy' word existed by which this new group of synthetic materials could be designated. Much thought was accordingly given to the coining of a non-technical, generic name for the polyamides, and some 350 different words were suggested. It was particularly desired to find a simple word —one not likely to be mispronounced.

"Because the names of two textile fibers in common use—namely, 'cotton' and 'rayon,' end with the letters 'on,' and because it appeared from the beginning that one of the principal outlets for the polyamides would be in the field of textiles, it was felt that a word ending in 'on' might be desirable. A number of words which otherwise seemed suitable were rejected because it was found they were not sufficiently distinct from words found in the dictionary, or in lists of classified trade-

marks. After much deliberation, the term 'nylon' was finally adopted.

"Textile fibers made of nylon are not rayon," it was pointed out. "In its Trade Practice Rules for the Rayon Industry, dated October 26, 1937, the Federal Trade Commission defines rayon as follows:

'The word rayon is the generic term for manufactured textile fiber or yarn produced chemically from cellulose or with a cellulose base and for thread, strands or fabrics made therefrom, regardless of whether such fiber or yarn be made under the viscose, acetate, cuprammonium, nitrocellulose or other process.'

"Since nylon is not produced chemically from cellulose, nor does it have a cellulose base, it follows from the Commission's definition that nylon yarn cannot properly be considered as a type of rayon. Furthermore, the properties of textile fibers and yarns made from nylon are quite different from the properties of any existing type of rayon, particularly as regards strength and elasticity.

"Nylon fibers are not properly termed 'synthetic silk'," the officials asserted. "Nylon is a 'protein-like' chemical product, which simply means that it has somewhat the same chemical composition as the proteins, of which silk, hair, and wool are common examples. Nylon does not, however, have an exact chemical counterpart in nature, and fibers made from it cannot, therefore, properly be referred to as 'synthetic silk,' although resembling silk in certain respects. The synthetic material—or rather family of materials—known as nylon is not only new, but different from any existing natural product or any other man-made material.

"Moreover, nylon does not refer simply to fibers or yarn spun from a synthetic polyamide, but to the polyamide itself, from which fibers, and other shapes, may be formed. The term 'nylon' does not refer to any particular form of the polyamide anymore than does the term 'glass' refer to any particular form or item of glass. Thus, nylon does not have reference to one particular chemical compound, but rather to a family of related synthetic compounds, the polyamides, of which there are many members."

• OPEN FORUM •

Rules under which this department of the REPORTER is conducted are as follows:

1. Anyone who has a technical problem on which he would like advice may submit it to the Reporter and it will be published in the first available issue.

2. Any reader who feels that he has a solution of the problem may forward his reply to us and if we feel that the reply is suitable it will be published in a succeeding issue.

3. For each such reply published the Reporter will pay a minimum of $2.

4. In case there is more than one answer to the same question, the one covering the subject in the most complete and authentic manner will be published, or if two answers are sufficiently different both will be published. If two answers are considered equally good, the one first received will be given priority.

5. The Reporter will assume no responsibility whatsoever for the accuracy of the answers submitted—it is simply offering a vehicle for the public expression of its readers' opinions.

6. Both the questioner and answerer must send in his complete name and address. When requested we will publish only the initials or other identifying insignia.

48—One of our correspondents presented the following problem. We hope that some of our readers will be able to give the necessary information.

"Our black shades and some of the very dark blue, after dyeing are given a treatment we call 'painting,' which consists of running the cloth over a knurled roller, the roller turning in a bath of the pigment solution with the surplus being scraped off with a doctor blade. The solution consists of ground Prussian Blue with turpentine and linseed oil, the proportions being on the average about six pounds of Prussian Blue, ten pounds of turpentine and 100 pounds of linseed oil.

"The amount picked from the roller by the cloth is then thoroughly brushed into the cloth, after which the cloth has to be cured or 'stoved.' This consists of hanging the cloth in festoons in large chambers which are then closed and heated to approximately 250° F. The cloth must stay in these chambers a minimum of twelve hours, and in some cases where the 'painting' solution is somewhat heavier than average, twenty-four hours is required for proper drying and oxidation.

"We know that there are mechanical dryers on the market which will give better heat and considerably better circulation than we now have in our stoves thereby shortening the curing time considerably, but we believe the better solution is from some chemical means of quicker drying through oxidizing materials."—**L. B. B.**

• CLASSIFIED ADVERTISEMENTS •

The rate for "Position Wanted" advertisements in this column is 2 cents a word—with a minimum of 50 cents per insertion. For all other types of advertisements—i.e., help wanted, machinery or supplies for sale—the rate is $5.00 per column inch or less per insertion.

WANTED: Opening for young, single, chemist with at least two years' laboratory experience in the analysis of oils, fats, soaps. Must have minimum of Bachelor's Degree, Protestant. Location central Atlantic State with small rapidly growing company. Give full particulars of experience, education, and salary required, enclose snapshot in application. Write Box No. 226, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

LABORATORY PRINTING MACHINE WANTED: Please state location of the machine, and lowest price acceptable. Write Box No. 225, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.

WANTED: Exceptional opportunity for thoroughly experienced laboratory man whose work has been on high grade unions, automotive fabrics and worsteds. State full experience and salary. Your reply will be held in strict confidence. Our present employees have been advised that we are advertising for a man of the above qualifications. Write Box No. 227, American Dyestuff Reporter, 440 Fourth Ave., New York, N. Y.